AUSTRALIAN
Turfgrass MANAGEMENT
ISSN 1442-2697 RRP $6.00 PLUS GST
VOLUME 7.4 AUGUST-SEPTEMBER 2005

GOING COUNTRY
21st Australian Turfgrass Conference Review

RESEARCH
Salinity tolerance of couch
Dollar spot

2005 AGCSA AWARD WINNERS
Peter Brown, Darren Jones
Scott McKay, Ben Marshall
Damien Bell

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AUSTRALIAN Turfgrass MANAGEMENT

Australian Turfgrass Management
Published by:
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ABN 96 053 205 888

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Printed by:
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contents

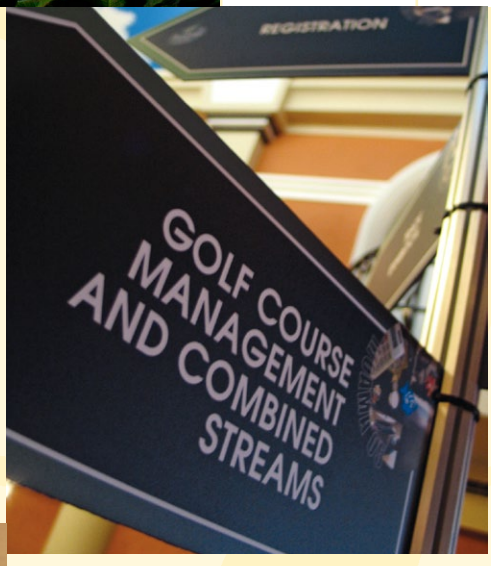
Above: Club Banora after the devastating June floods

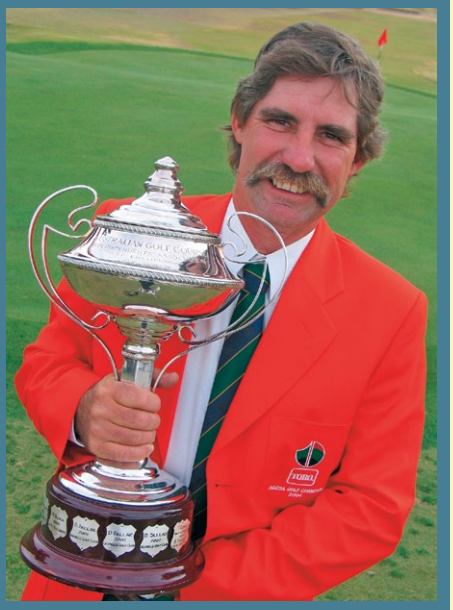
Right: The 21st Australian Turfgrass Conference

Below: Peter Brown, 2005 AGCSA Distinguished Service Award winner

Top right: AGCSA Golf Champion Trevor Ridge

Bottom right: Dollar spot - a familiar foe





In Every Edition

doing it tough

Welcome to this edition of Australian Turfgrass Management magazine. The first few months of winter have certainly thrown a few surprises the way of superintendents and turf managers around the country, particularly those on the Gold Coast and northern New South Wales.

Our cover story this edition examines the aftermath of the devastating floods which swept through the region in late June causing millions of dollars worth of damage across many courses. We talk to superintendents Bob McCowan, Steve Watsford, Paul Lierse, Doug Robinson, Jeff Gambin, Darren Moore, Peter Lonergan and Stuart Laing who had their crews in serious clean-up mode after their courses bore the brunt of the unseasonal deluge. Just to give you a taster, Surfers Paradise Golf Club recorded an incredible 1092mm in five days!

With many maintenance crews down on numbers due to the time of year, remaining staff were forced to put in some serious hours during the clean-up process in order to get their courses back in shape. Speaking to many superintendents in the aftermath of the floods, all have expressed their gratitude towards their respective crews for going above and beyond the call of duty during those trying weeks.

If there is one superintendent who can sympathise with the events from up north, it is Melbourne-based Dean Johnson from the nine-hole Yarra Valley Country Club. The last 12 months can only be described as a nightmare for Johnson who has spent in excess of $300,000 repairing the course after two major floods and a spraying incident which decimated all 10 greens.

The horror run for Johnson began in November last year when 80 per cent of the course was swamped by a rising Yarra River, ruining five greens, destroying all bunkers and wrecking the pump station.

Johnson had barely got the course back in play (in fact he was a day out from having the final green – the 4th – back in play) when the heavens dumped 160mm between 2-3 February. The resultant flooding was more devastating. The 4th went again and the course was under water for two weeks leaving silt deposits of up to eight inches across all greens.

And that wasn't the end of it. A couple of months later, a staff member sprayed all greens with glyphosate instead of insecticide while Johnson was away on leave. Johnson was forced to re-turf seven greens, hydroseed one green, and scarify and reseed the remaining three, and when ATM spoke to him in early July he had just finished re-turfing the final green.

"It was a long summer and it has been an even longer winter," said Johnson in a classic understatement. "I've been here 15 years and it's easily the worst period I've had to deal with."

Elsewhere in this edition we profile the 2005 AGCSA Award winners as part of a complete review of the 21st Australian Turfgrass Conference, while the research section looks at the salinity tolerance of couchgrass and the diversity and biology of the dollar spot organism.

Enjoy the read.

Brett Robinson
Editor

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Dean Johnson (Yarra Valley CC)
Darren Jones (St Michael's GC)
Stuart Laing (Royal Pines GC)
Paul Lierse (The Glades GC)
Peter Lonergan (Coolangatta Tweed Golf Club)
Bob McCowan (Club Banora)
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Mark Prosser (VGCSA)
Doug Robinson (Pacific Golf Operations)
Brad Sofield (Gosnells GC)
Anthony Uhr-Henry (TGAA)
Steve Watsford (The Colonial)

foreword thinking

AGCSA CHIEF EXECUTIVE, STEVEN POTTS

Welcome to the August-September edition of Australian Turfgrass Management magazine.

With the 2005 21st Australian Turfgrass Conference behind us, I would like to thank all delegates, speakers and exhibitors for a truly memorable week. The feedback from the Moama event has been truly remarkable and I would additionally like to thank everyone who has taken the time to write or call the office with their thoughts. A full report from the 2005 Australian Turfgrass Conference is included in this edition of the Australian Turfgrass Management magazine and makes for great reading.

The regional conference philosophy was well endorsed by the turf industry with the success of the Moama conference and we are now beginning the search for suitable venues to host the 2007 conference. An online survey regarding suitable venues was recently completed to gauge feedback from members, and armed with this information we are currently conducting feasibility studies on several venues. An announcement of the 2007 venue will be announced later in the year.

As for 2006, the Brisbane Convention Centre will play host to the 22nd Australian Turfgrass Conference from 17-21 July. Plans are already underway for what is set to be a major gathering so stay tuned to the AGCSA website and publications for further details as they come to hand.

As part of the 2005 conference, the AGCSA AGM was held with around 50 members attending. The meeting accepted all of the business items circulated on the notice of meeting and reappointed Martyn Black (Castle Hill Country Club) and appointed Allan Devlin (Secret Harbour Golf Club) to the Board for a period of two years. They join president Jeff Gambin (Gold Coast Burleigh Golf Club) and Board member Jon Penberthy (Tewantin Noosa Golf Club).

The AGCSA Board is focussed on continuing to build on the strong foundations of the association and raising the profile of the superintendent both within the golfing community and the general public. The Board is continually reviewing the association's objectives and service to members, and as such, if you have any feedback or ideas please do not hesitate to contact the office or Board members direct.

The National Turf Education Committee has recently met in Canberra. The Delivery and Assessment Guides for Certificate III Horticulture, which have been in use for six months, received a very favourable response from around the country and I would like to congratulate all of the TAFE colleges currently teaching to the industry endorsed guidelines. The committee is currently nearing the release if the Delivery and Assessment Guidelines for Certificate II and V and I encourage all turf managers to ask their TAFE college if their apprentices are being taught up to the industry standard.

The National Turf Education Committee plays a vital role in the future of the turf industry and has been focussed on developing a clearly defined, nationally endorsed pathway to produce qualified greenkeepers which meet the expectation of the industry. With the release of the Delivery and Assessment Guides for level II, III and V and the endorsement from all turf bodies and the Australian Golf Union, this pathway is largely established.

As all current turf managers would agree, the demands of the job have changed considerably over the last 10 years. With the increased managerial and legislative requirements it is generally accepted that 70 per cent of your time is allocated to management issues with only 30 per cent allocated to operational issues. The next challenge for the education committee is to clearly define and implement the pathway to provide the skills necessary to take the quantum step and become well rounded turf managers.

Enjoy the magazine.

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It took six full days of pumping to clear floodwaters from Club Banora

Coast counts the costs
The Winter Floods of 2005

The last week of June will be one many superintendents on the Gold Coast and northern New South Wales would rather forget. Record unseasonal rainfall caused extensive flooding which severely damaged many courses, leaving a clean-up bill which will top millions of dollars. ATM tracks the trail of destruction and talks to those superintendents whose courses bore the brunt of the rains.

Winter is meant to be a quieter time for superintendents. With growth rates slowing and reduced disease activity, it's often a time when attention is diverted away from day-to-day course maintenance and focused on getting paper work up to date and outlining plans for the busy spring and summer ahead.

Little then could prepare superintendents on the Gold Coast and northern New South Wales for the devastating unseasonal rainfall that hit the region in the last two days of June. After the best part of five years of relatively dry conditions compared to normal weather patterns, the five days from Monday, 27 June to Friday, 1 July will go down as some of the wettest on record.

Intense rainfall, caused by an upper trough system and east coast low, smashed the coast overnight on the 29th and early on the 30th, resulting in widespread flooding on a scale never seen before.

According to official Bureau of Meteorology (BoM) statistics, the event resulted in June rainfall totals that were two to three times the average, and produced the heaviest June daily rainfalls seen in Queensland since 1967, when Springbrook set a Queensland June record with 621mm.

The highest totals recorded in the 24 hours to 3pm on 30 June included Loder Creek Dam (587mm), Carrara (585mm), Evandale (578mm) and Biggera (563mm).

In the 24 hours to 9am on 30 June, several long-standing records for June daily rainfall totals were broken, including Nerang with 346mm (previous highest 317.4mm in 1892, 115 years of record) and Oxenford with 290mm (previous 246.1mm in 1948, 102 years of record).

Coolangatta Tweed Golf Club, home to superintendent Peter Lonergan, is used by the BoM as the official station for Tweed Heads and from Monday through Friday 730.6mm was recorded. Amazingly, 569mm of that fell in the 19 hours from 6am Thursday to 1am Friday, setting new June and July 24-hour records for the station.

The Carrara area, which boasts a heavy concentration of golf clubs (Palm Meadows, Lakelands, Colonial, Robina Woods, The Glades, Royal Pines and Surfers Paradise), had all the records on the coast.

Some of stats make for incredible reading. Surfers Paradise recorded an amazing 1092mm – over a metre of precipitation – for the week, while the likes of The Glades, The Colonial and Club Banora, three of the worst affected clubs, had flood waters well above previous record levels.

Taking into consideration the replacement of irrigation systems, bunker sand, golf carts, rubbish removal, equipment hire and general repairs to greens, fairways and roughs, not to mention labour costs, the industry is looking at a damage bill that is likely to go into the millions the dollars.

The rains came at a time when most regions of Australia recorded above average rainfall for the winter months. Perth had its wettest June for 37 years while Adelaide experienced its wettest June since 1981.

In the weeks after the floods, ATM caught up with some of the superintendents affected and what follows are their accounts of the nightmare events.

Gold Coast Burleigh Golf Club early on Thursday, 30 June

BOB McCOWAN - CLUB BANORA

When Club Banora superintendent Bob McCowan received a call from his general manager Kevin Hennessy at 5am on the morning of 30 June, he feared the worse.

By the time he arrived at the course, the waters were already lapping at the maintenance shed and the course was starting to disappear. Just a few hours later there was two feet of water in McCowan's office, and the entire 50 hectare complex was under, a state in which it would remain for six days.

"It was a complete nightmare," said McCowan. "We just got inundated. There was about nine feet of water across the entire course which was about a metre and a half higher than it has ever been.

"I've been the super here for 15 years and at the club for 25, and it was the worse I have ever seen. I thought I'd be retired before I saw something like this."

As it transpired, Club Banora recorded 711mm over a 27-hour period and across the whole facility the club is looking at over $700,000 in damage. Most agonising was the loss of the 10-month old $180,000 irrigation system.

"We lost all our satellites and all the irrigation pumps went under too," said McCowan. "When we installed them, I put them out of flood range. Or so I thought.

"Just on the course itself we're looking at around $300,000 damage. Basically everything that normally wouldn't go under did. It has been pretty devastating but there's not much you can do about it.

"We weren't really prepared. We had about three inches the night before but it eased off. Then it started coming down around midday and it just didn't stop and we were getting three inches every hour. We had about three feet through the shed but luckily none of the machinery was too badly damaged."

With no natural run off, all surface water had to be pumped off the course and with four pumps sucking out a million litres an hour, it took six full days to remove all the water.

"Normally it would take about three days to get water of the course, so it shows just how much we had," said McCowan. "Three greens popped out on Monday, another eight appeared on Tuesday but we still had to go through about a foot of water to get to them. On Thursday the last lot appeared, almost a week later.

"As they started to emerge we got stuck into them raking the silt off and the only way to get to them was by boat. We got a 15 foot runabout from the local fishing club so we could move around the course. It was pretty hard to believe. Getting around by boat takes some beating."

An inch of silt was deposited on most greens with McCowan forced to scarify them: "Luckily they were in healthy condition and they were able to take it."

The fairways also copped about an inch while the carpetgrass roughs were the worst affected. With three inches of silt covering most of the rough, McCowan lost substantial areas after being under water for the best part of a week.

STEVE WATSFORD - THE COLONIAL GOLF CLUB

The damage bill will be in the hundreds of thousands of dollars at The Colonial after 630mm in 48 hours resulted in the course flooding to levels never seen before. It was the sort of event that left superintendent Steve Watsford scratching his head and his crew facing a massive clean-up operation.

"It was just incredible the amount of water we had," said Watsford. "We weren't prepared for it at all. We came in at 4.30am in the morning to move some of the carts but they were already gone.

"We've had big floods before but nothing to this extent. The water was about a metre and a half above the 1991 mark. It has been a learning curve that's for sure."

Watsford, who was assistant superintendent at Moore Park Golf Club when the April 1999 hailstorms struck Sydney's eastern suburbs, said it was the longest time he has seen for the waters to drop, with the front nine adjacent to the Nerang River under water for around six days.

"We lost a lot of bunkers rakes, bins and tee markers which we recovered further along the river," said Watsford, who was in the process of getting quotes for a new irrigation system when ATM called.

"Ten satellites were ruined, all 84 bunkers were washed out and covered in silt and the cart paths were a mess. Four of our 328 greens had a couple of inches of silt. We raked them and hosed them off. Even though it's not the ideal time, we lightly verticut them to get rid of the dry mud.

"The Wintergreen fairways were a big mess. They were that wet it was hard to get anything on them. There was just so much rubbish and debris we had to remove. We even had a dead cow on one fairway.

Sixty-eight carts were swamped at The Colonial

"Unfortunately we're a flood plain and we're designed to take it. There's not really a lot we can do about it in the future. We can only hope we don't get one to that extent again. The only good thing to come out of it was that the waters flushed our lakes of salvinia."

While the course copped a hammering, so too did the clubhouse, with 68 golf carts housed in the basement destroyed.

The pressure is now on for Watsford and his crew to get the course back in shape for a major pro-am event the club is hosting in conjunction with Royal Pines in late September. Royal Pines superintendent Stuart Laing was also counting the costs after the floods, with both the East and West courses submerged. The floods caused extensive damage to bunkers as well as the irrigation system.

DOUG ROBINSON - SURFERS PARADISE GOLF CLUB

In the 30 years that Doug Robinson has plied his trade on the Gold Coast, even he wasn't quite prepared for the deluge that hit Surfers Paradise Golf Club in late June. From Monday, 27 June to Friday, 1 July, the rain gauge collected an incredible 1092mm. The daily readings were:

- Monday, 27 June 10.5mm
- Tuesday, 28 June 35.5mm
- Wednesday, 29 June 45mm
- Thursday, 30 June 465mm
- Friday, 1 July 536mm

"Thursday was a nightmare," said Robinson. "The damaging stuff fell through the night and by the time most of the crew arrived on Thursday morning the course was already 90 per cent under. It took about three days to get it back in shape.

"We were pretty lucky in real terms. I was expecting a lot worse. We tend to have the water back up rather than flowing through the course in these sorts of events, so we didn't have a great amount of damage apart from debris and bunker wash outs.

"It's as much rain as I've seen in my time on the Coast and that goes back over 30 years. It was reported the rainfall for the Tweed area was the heaviest in 99 years.

"Our mechanic was here in the 1974 floods. He was saying it didn't come up as high as then, but we probably had more rain this time. Luckily the tides were in better sequence (high tide was around 3pm) and the water was getting away as it was coming in which was pretty fortunate or it could have been a lot worse."

Surfers escaped with minimal silt deposits across the course, but there was plenty of debris to remove. The crew was able to get a hand operated blower and tractor mounted blower to blow the debris into the rough which was then cut by outfront mowers with mulcher decks. The one good thing to come out of the event was that the rains helped to flush out sodium and bicarbonates from the course's irrigation water.

While the course got off relatively lightly, some members were on the phone to their insurance companies after a fleet of private buggies were destroyed.

After five years of relatively dry conditions, Robinson said the event was certainly a wake up call for all on the Coast as to the potential for damage from such events.

"We have no real system in place [to deal with these sorts of events] and it's pretty much a case of suck it and see and then evaluate what needs to be done," said Robinson.

"There is a format I suppose that if heavy weather is forecast we make a point of getting around and checking all the drainage points on the course – making sure all the field inlets are clean, the grates are clear and clean so that water can get away. Then after a heavy event that's the first thing we check.

"We've probably had five years of relatively dry conditions compared to our normal weather patterns so I suppose a bit of complacency sets in and an event like this shows just what can happen."

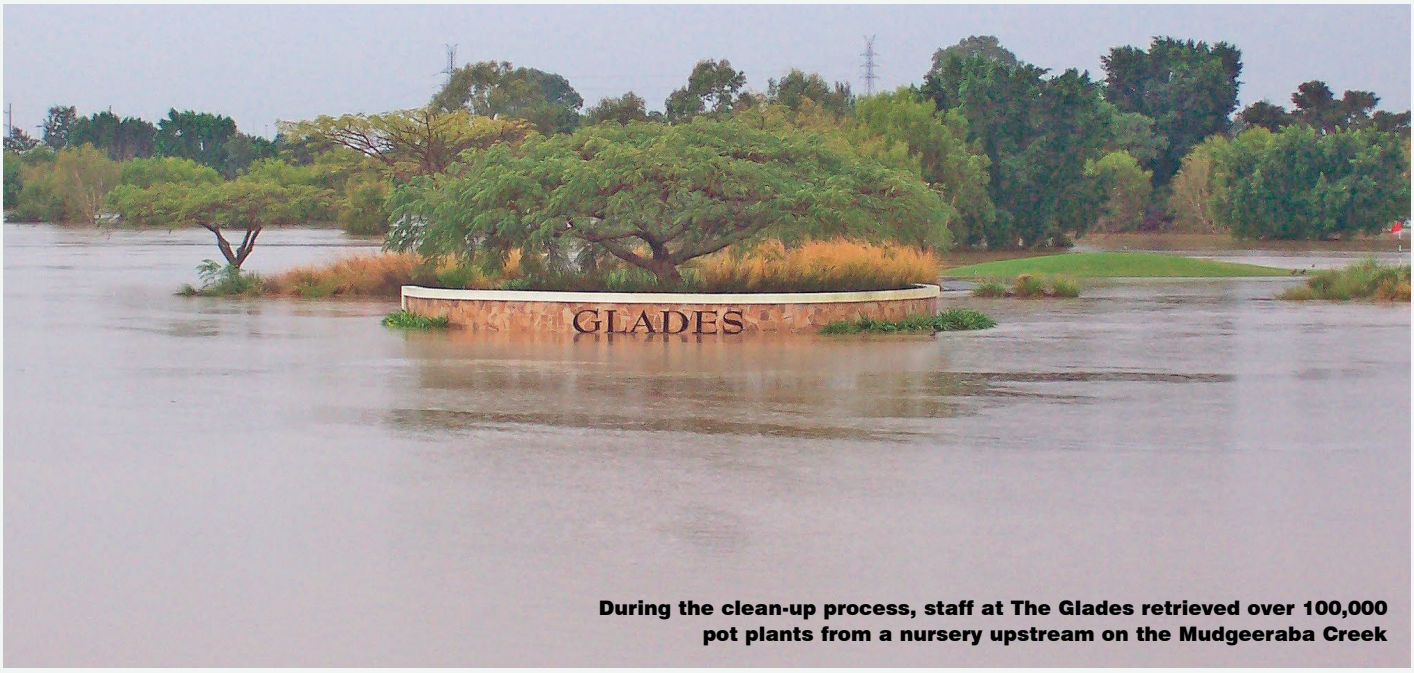
PAUL LIERSE - THE GLADES

Paul Lierse is thinking of branching out into a new field of horticulture following the devastating floods. During the fortnight clean-up process, Lierse and his crew collected over 100,000 pot plants that were deposited once the waters subsided.

"Whatever they had up in the mountains came on to the course," said Lierse, who recorded 720mm in a 72-hour period. "Within 48 hours of Mudgeeraba Creek going down we were able to get rid of the water but we had mud, slime and pot plants like you wouldn't believe.

"There must be a nursery upstream because we had at least 100,000 pot plants all over the course. We've still got some up the trees! I've got to find this bloke. They've come down before apparently so I think the poor guy might be a bit out of pocket after this one."

Taking over from Brad Burgess at The Glades just 15 months ago, the deluge was the worst Lierse has seen with flood levels 30cm above the course's previous highest mark. With Mudgeeraba Creek breaking its banks, the entire course went under, including ▶



During the clean-up process, staff at The Glades retrieved over 100,000 pot plants from a nursery upstream on the Mudgeeraba Creek

all greens, bunkers and satellites. At a rough estimate Lierse reckons there is well over $100,000 worth of damage, half of that to the irrigation system.

"It's quite a sight when you go to a satellite box and open it up and it's just a big mud pie," laughed Lierse. "Fortunately this didn't happen in summer and we're not under the pump for irrigation.

"I've been floating around Asia for the past 10 years and I'm used to seeing heavy rain, but this was quite horrific. The main problem was the mud. If it was clean water it wouldn't have been such a drama.

"But we had some beautiful drying conditions immediately after and we were able to sweep the mud off and do a bit of a mow and the greens came up pretty good. We lost about 30 per cent of the 14th green which was washed out right down to the sub base.

"We've got bentgrass greens so it was fortunate this happened now rather than summer. If this had happened in summer then you've got all your pythium, brown patch type diseases that would start to flourish with the heat and humidity, but being in winter it wasn't so bad. We gave them a preventative fungicide straight after and they responded well."

DARREN MOORE - LAKELANDS GOLF CLUB

Darren Moore is no stranger to torrential rain. Having worked in the Philippines for six years, the Lakelands Golf Club superintendent for the past two and a half years has seen his fair share of precipitation and destructive aftermaths of flooding. However, even Moore was surprised at the deluge that hit Lakelands which recorded more than 500mm in the 24 hours over Wednesday and Thursday.

"A few of us up here on the Coast have worked in Asia and have seen a lot of rain, but this would be close to the heaviest I have ever seen," said Moore. "It just didn't let up. The cells were coming down the coast and sitting right on top of us.

"By Thursday morning it was torrential. We were sending staff home at that stage because they couldn't get to the course. In fact six of us got stuck in the shed until 4.30pm."

While the course went under, most of the damage was limited to bunker wash outs. The clean up began on Friday and continued solidly for about three to four days with most of the work focused on removal of debris and getting the 100 Nicklaus-designed bunkers back in play.

"We probably fared pretty well" said Moore. "We had a lot of holes under water but not the extreme mud that other courses had. We had a couple of controllers that had never been under before go under.

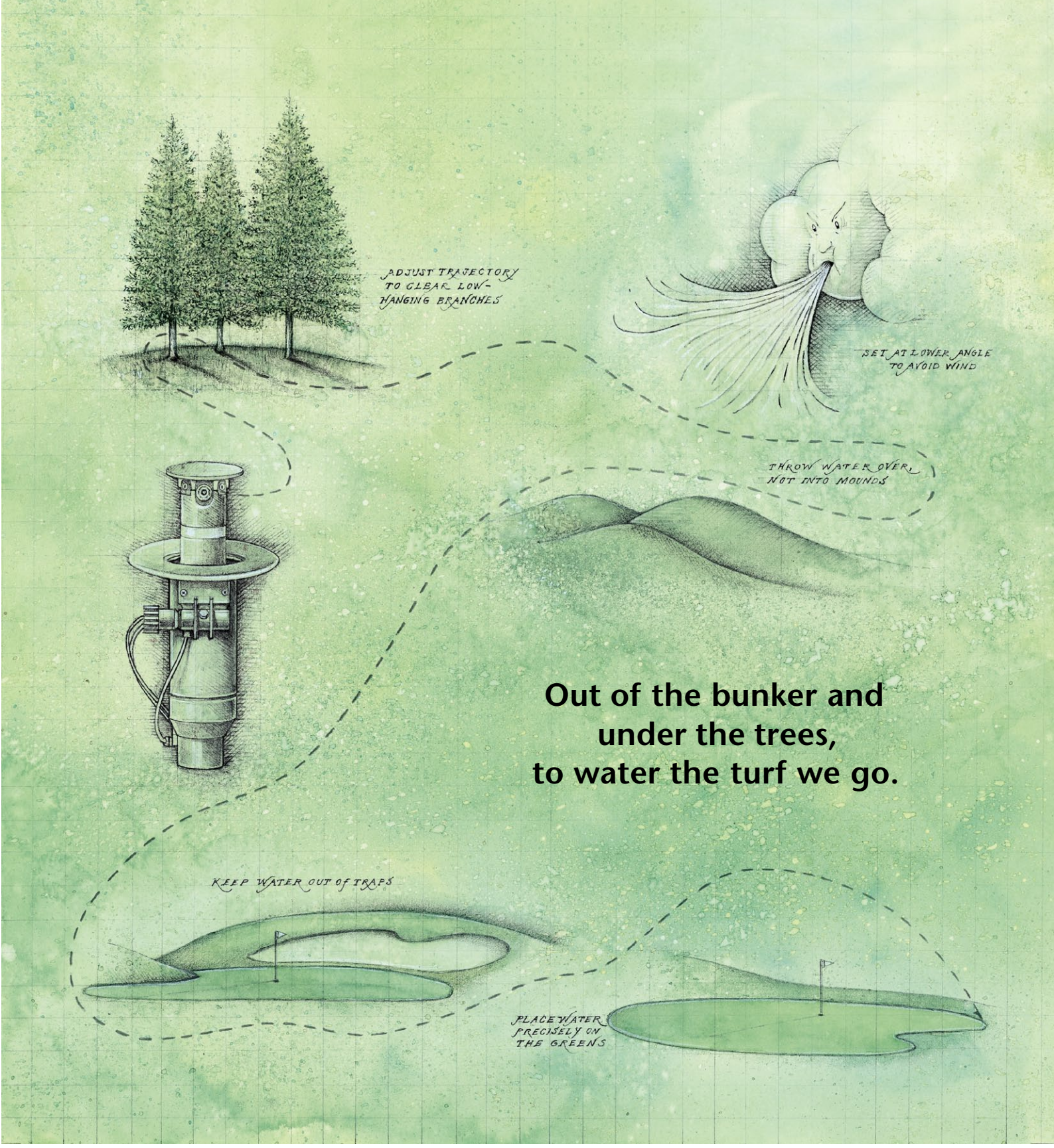
"Our major clean up was the removal of debris. We have major agricultural land just upstream and a lot of debris from there came through the course. The course is sand capped with 300mm across the whole site so it drained pretty good. The greens came out fine and we put some fungicide on them afterwards.

"I suppose one thing that could come out of this is whether courses are prepared for an extreme event or a disaster.

"In the Philippines we sometimes had 25 inches in a week and a huge amount of damage. We had emergency plans in place where we made sure we had ropes, chainsaws and back-up materials.

"Maybe supers need to look at contingencies. The key is to keep an eye on your site and be prepared. We had five or six guys here constantly checking things.

"As with other major issues like workplace safety and the environment, I suppose you have got to constantly think of worst case scenarios."



Out of the bunker and under the trees, to water the turf we go.

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Conference draws rave reviews

Echuca-Moama 2005

With water management issues such a hot topic in the turf industry, the Murray River provided a fitting backdrop for the 21st Australian Turfgrass Conference. Held in Echuca-Moama for the first time in its history, the week-long event drew unparalleled positive feedback. Over the course of the next 14 pages ATM reviews all the highlights of the conference, from the education sessions, AGCSA Awards, AGCSA Golf Championships, through to the unique social functions which were again a highlight.

The regional conference concept has been widely lauded following a highly successful 21st Australian Turfgrass Conference in Echuca-Moama. Around 450 delegates and trade representatives embraced the first truly regional conference which carried the theme of how to save time and money.

In the weeks after the conference, the AGCSA fielded an unprecedented amount of feedback from delegates and the trade, the first time the AGCSA has received such unsolicited feedback.

"I think from all aspects the 2005 conference was a great success," said AGCSA business development manager Scott Petersen.

"Each year the costs associated with attending the metropolitan based conferences prohibit some delegates from attending.

"One of the major objectives of the regional conference was to encourage participation from regional turf managers and to enable the bigger facilities to bring their assistants to expose them to the educational and networking opportunities at a cost effective rate.

'Just by the feedback we've had – without asking for it – shows just how popular the concept was. The overwhelming consensus is that those who missed out are kicking themselves."

Much of the feedback was along similar lines, with delegates commenting they enjoyed the smaller format and less formal regional setting, while the social functions made a pleasant change from the big city locations.

The smaller format tradeshow proved to be a big success

Some of the best feedback, however, came from members of the trade. Many of the 30 companies who exhibited at the two-day tradeshow liked the smaller format which gave them plenty of opportunity to spend quality one-on-one time with delegates.

While the 2006 22nd Australian Turfgrass Conference returns to Brisbane next year, the AGCSA is planning ahead for 2007 with the AGCSA Board set to digest all the figures from Echuca-Moama this month.

Already the AGCSA has asked for feedback on potential conference venues for 2007 and recently conducted an online poll through its weekly email newsletter The Cut.

The poll gave readers five options – Alice Springs, Cairns, Canberra, Darwin and Perth. Sixty-eight people responded with Cairns coming out on top with 36 per cent of the vote, followed by Perth on 14 per cent. Darwin and Canberra polled 9 per cent, Alice Springs came in at 7 per cent, while 25 per cent went for 'other'. Those ranged from various venues on the Gold Coast to Launceston.

'RIDGE' RIVER

Conference week kicked off in the best possible manner for co-defending AGCSA golf champion Trevor Ridge. The Sawtell Golf Club superintendent fired a two-over par 74 on the East Course at Rich River Golf Club to win the AGCSA Golf Championships by one shot from co-defender Anthony Toogood.

Ridge became the third superintendent to win back-to-back titles, emulating the feats of three-times winner Daryl Sellar (2001-2003) and Peter Schumacher (1996/1997).

Ridge's defence of the coveted Toro Red Jacket started a little shaky with a bogey on the first before he recovered with a timely two on the par 3 3rd. Bogeys at four and five threatened to cast a shadow over his round, but a stunning 8 iron to within six inches on the sixth set up an easy birdie.

Heading into the back nine one over, Ridge squared the ledger with a birdie on the par 5 11th but couldn't quite maintain the momentum, dropping shots at 17 and 18.

Toogood (Albury Golf Club) also went out in one over, and despite a birdie on 17 dropped a couple of shots to finish with 75. Recently crowned AGCSA Board member Allan Devlin also acquitted himself well, shooting 76 with a hire set of clubs to finish third. One over through 13, Devlin was left ruing a run of bogeys on 14, 15 and 16.

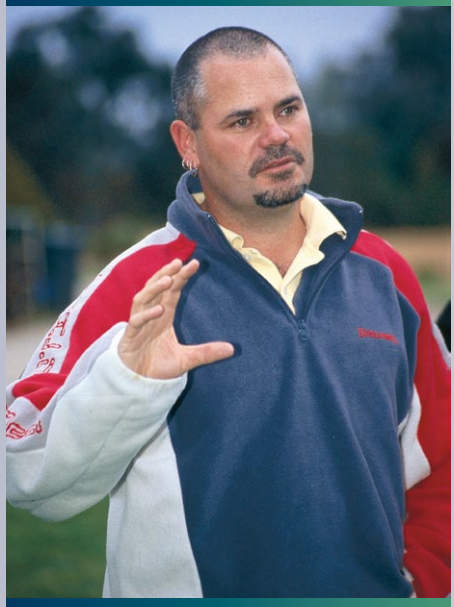
With Ridge leading the way, it was no surprise that NSW won back the team title. It wasn't all plain sailing, however, and the NSW contingent of Ridge (37 points), Martyn Black (34), Guy Thomas (27) and Craig Molloy (24) (total of 122) only finished a single point ahead of the Queenslanders who were led by solid 33s from Stuart Moore and Pat Pauli. Colin Cowden (35) and Peter Jans (31) helped guide 2004 runners up Victoria into third.

The stableford title was close fought, with Anthony Ross (Nelson Bay Golf Club) prevailing with a very sweet 41 to win by one point from Bryce Mulvogue (Sorrento Golf Club).

Playing off a 24, Ross's round included a four point haul on the number one stroke hole (12), while on seven holes he scored three. Remarkably, Ross recorded a wipe on the 5th, finishing with 17 points on the front nine and an impressive 24 on the back nine. Off 13, Mulvogue scored four points on the par 5 1st after he nabbed a birdie, the first of two.

Other noteable efforts included:

- Stephen Pellatt (Blackwood Golf Club) walked away with the nearest the pin on the par 3 16th, but there was a reason why he was a little sheepish when collecting his prize. Despite blasting his tee shot to within a foot, he proceeded to two putt. He finished with 17 points.
- Growling Frog superintendent Wayne Dale had a horror finish. A bit wayward for most of the round, Dale recorded consecutive 12s on 17 and 18 to finish with 105. Eight of those 12 shots on 17 were taken to get out of a bunker!
- Shooting a very respectable 78 was Hawksnest superintendent Mark Johnson who carded three birdies, including a two at the 16th. Other superintendents to manage birdies were Wayne Gregory (3rd and 7th), Andrew Heskett (4th and 7th), ▶



Cobram Barooga superintendent Terry Vogel

Brendan Warby (2nd), Mark Couchman (4th), John Nelson (8th), Shaun Probert (8th) and Justin Sheehan (11th).

- Host superintendent Andrew Johnson had a round he would rather forget. Despite knowing the East Course layout like the back of his hand for the past eight years, Johnson could only manage a paltry five points on the front nine before finishing with a miserable total of 15.
- Competing in the championships must mean a lot to Highlands Golf Club superintendent Brendan Warby. Obviously thinking he was a chance, Warby left home shortly after midnight Saturday and drove an impressive six hours to make it in time for the shotgun start. Warby was unable to make the trip on Saturday on account of his after hours job as a DJ at a friend's 30th. For the record, he shot 89.
- Leon Hennessey from Long Reef Golf Club certainly got his money's worth at Rich River. Playing off a 27, Hennessey fired 61 on both nines for a grand total 122 and 16 points. His round included three nines.

The scoring was also pretty impressive at Barham Golf Club which played host to the AGCSA Corporate Cup. Playing off a 27 handicap, Paul Brown walked away with the title by one shot from Brendan Longstaff. Brown finished with 40 points, with 22 coming on the back nine. Longstaff fired the best round off the stick, finishing with a one over par 74 to finish with 39 points.

Shot of the day came from Chris Blagg who scored a two on the par 4 9th en route to scoring 38 points. At the other end of the scale, Dave Rayner won the NAGA Trophy on a countback from Darren Kennedy.

Birdies went to Kym Fuller (14th and 15th), Darren Harvey (2nd), Simon Cusack (2nd), Shane Guerra (3rd), Paul Dugmore (11th), Craig McLachlan (12th), Mark Gahan (17th) and Daniel Metcalfe (18th).

John Neylan was among the strong line-up of local speakers in Echuca-Moama

SPEAKING OUT

The education component of the conference kicked off with a series of keynote presentations, the first of which came from financial expert Jon Griffin on loans and leases before John Neylan and Geoff Connellan double-teamed to talk about water management plans.

Throughout the remainder of Tuesday, Wednesday and Thursday, delegates were able to listen to a range of topics ranging from Dr Louise Barton's research into nitrogen leaching through to environmental law by Carlo Zoppo. Terry Muir's risk management session was well attended, while Andrew Peart provided an insight into what it is like maintaining golf courses in the Middle East.

Mica Franklin from Aquatrols outlined research into the new wetting agent Revolution (see Around the Trade, page 46), Jim Hull from the University of Sydney talked on phosphorous nutrition, while a candid Ross Watson talked about the new Magenta Shores development.

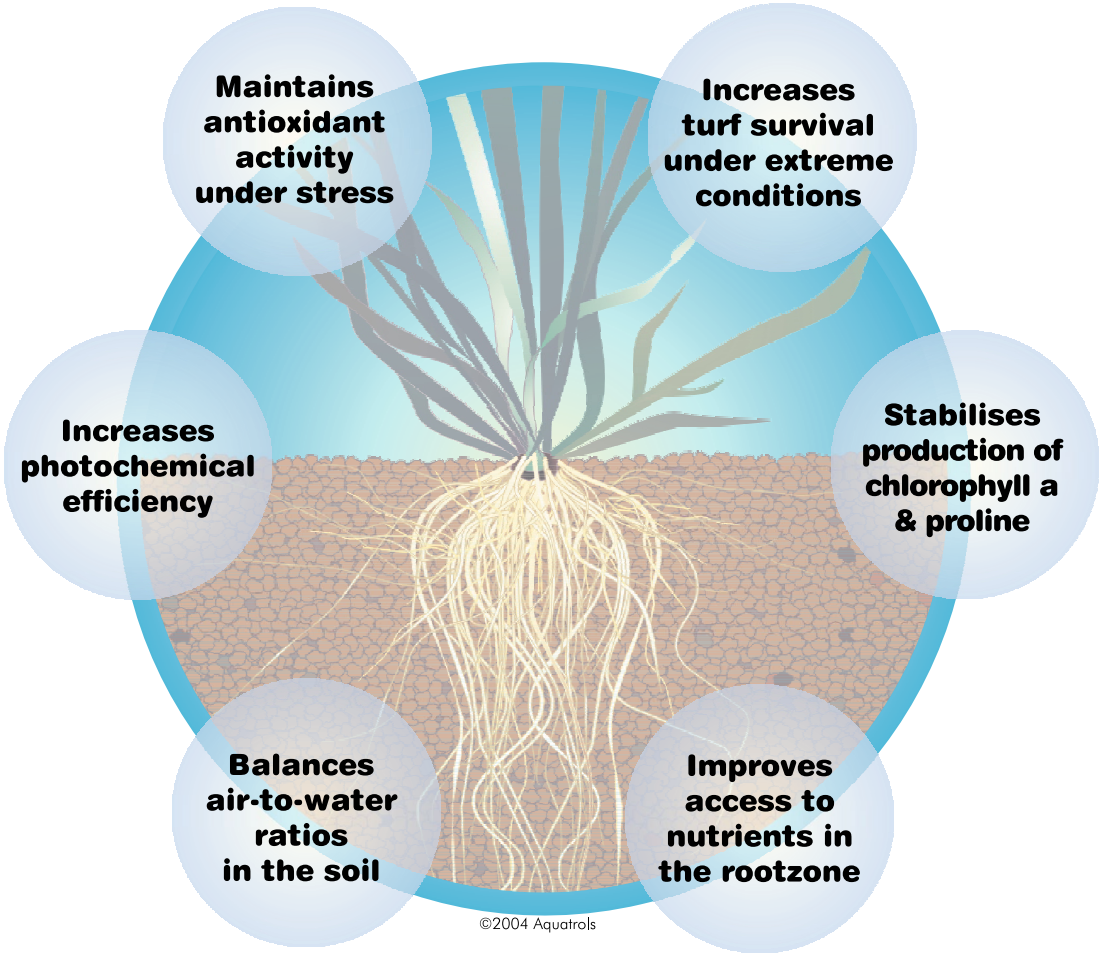
MURRAY RIVER TURF TOUR

The conference concluded on Friday with the turf tour which took in two of the Murray River's finest courses – Cobram Barooga and Yarrawonga and Border – as well as the Heritage Seeds research facility in Howlong.

The first stop was Yarrawonga and Border, home to superintendent Michael Swanwick and assistant Grant Allen. The two took 30 delegates around the Murray Course designed by Peter Thomson and Mike Wolveridge.

Yarrawonga and Border is a massive complex with the adjacent Lakes Course and

The Revolution is coming !



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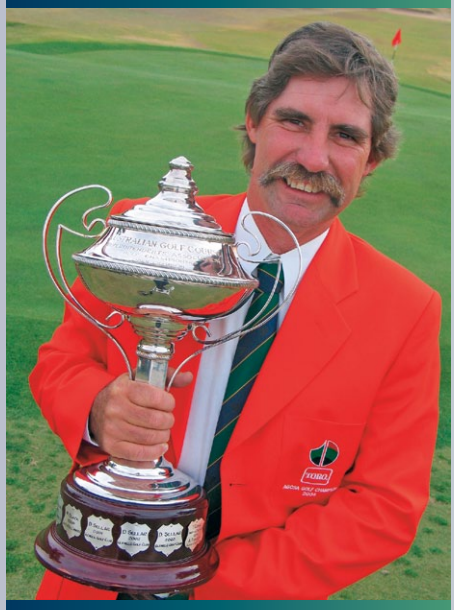
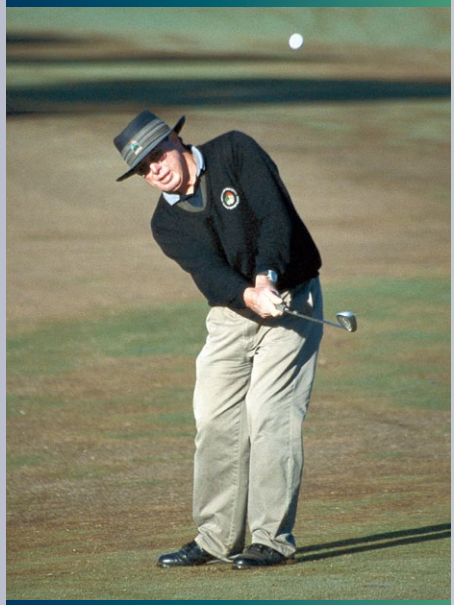


2005 AGCSA Golf Championships winner Trevor Ridge



Wayne Dale makes his approach to the sixth at Rich River

Executive Nine combining with the Murray to make up a 45-hole facility. Originally all cool season grasses, in the early 1990s Swanwick converted the Murray and Lakes to Santa ana following extensive trials. All tees and green surrounds, roughs and carries were also converted and the shorter Executive Nine is next to be converted.

As for the greens, Swanwick said the club is looking at options for their reconstruction. A lot of the present greens are push-up with some almost 50 years old. Not surprisingly there are a number of inherent problems with their drainage, leading to high moisture content and the development of excessive thatch.

After a lunch stop at the Heritage Seeds research facility in Howlong, where delegates were able to examine plots that are part of the AUSTEP trials, the final stop of the tour was at Cobram Barooga Golf Club.

As delegates arrived the heavens started to open, the first rain the course had seen for some time according to superintendent Terry Vogel, who remarkably is just the third superintendent at the course in 75 years.

A very candid and passionate Vogel outlined some of the constraints he and his 15 staff have to work with in maintaining the 36-hole complex, which comprises the Old Course and newer West Course.

One of the common themes to emerge from both Vogel and Swanwick was just how competitive the golf industry has become along the Murray.

With clubs continually under-cutting each other in their search for the golfing dollar – discounted memberships and golf holiday packages – a number of clubs are starting to struggle financially which in turn has had a direct impact on maintenance budgets

"It is very cut-throat," said Vogel. "It hasn't been a great 12 months for the club and, sadly, all the decisions we make regarding the maintenance of the course are financial."

Nevertheless both superintendents and their respective crews can be proud of their achievements, with the Murray Course and Old Course constantly rated among the top 100 public access courses in Australia by golfing publications and websites.

AFTER HOURS

The regional setting for the 2005 conference meant there were a wide variety of social functions which provided some unique and memorable occasions. From fishing on the Murray to the Great Aussie Beer Shed, delegates got to experience some unique country hospitality.

The Welcoming Cocktail Reception, sponsored by Country Club International, Enviromist and WaterStax embraced the country theme with sheep shearing and duck racing. The Calcutta auction raised $735 for cancer charity Canteen.

At the Great Aussie Beer Shed night, sponsored by Syngenta, delegates were dazzled at the incredible collection of beer memorabilia which would no doubt have brought back a few memories for some. For the record, 80 slabs of beer were sampled as part of a full experience.

But the highlight of the week surely had to be the Scotts Paintball Challenge. Around 40 delegates were kitted up with air guns and fluorescent pellets, split into two teams (NSW v Rest of the World) and told to kill.

Some over-eager punters took big pastings and a few ended up sporting serious bruises, none more so than Shaun Probert (see photo spread, pages 20-24).

Adam Jones scored the Claret Award after copping a direct hit to the ear which drew blood, while a pumped up Damien Bell went out in style with a spectacular last gasp Rambo-like rampage. There was one casualty, however – Tura Beach Country Club superintendent Peter George aggravated an old knee ligament injury after taking a running dive to evade being hit.

The AGCSA wishes to thank all delegates and companies who supported the 21st Australian Turfgrass Conference and also Moama Bowling Club.

The Australian Turfgrass Conference...

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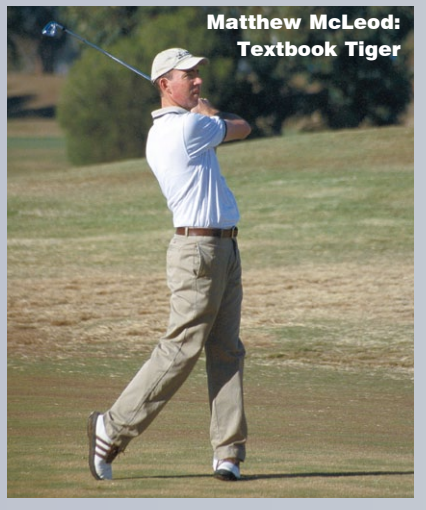
Conference goes country

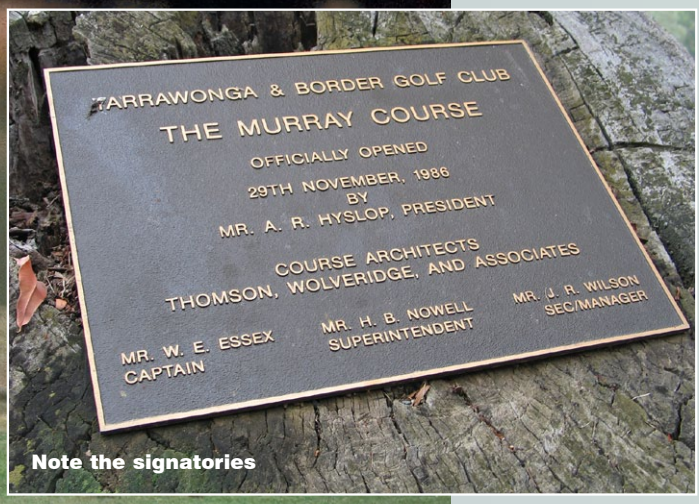
The Murray River acted as a fitting backdrop to the first truly regional Australian Turfgrass Conference which touched down in Echuca-Moama back in June. The new format proved a huge success for both delegates and the trade with an unprecedented amount of positive feedback following the conference. Those who attended will take away plenty of memories, and for those who were unlucky to miss out, here are some select images from Echuca-Moama as captured by the turfgrass paparazzi.

Toro's Robert Rein and Ken Woods with golf champion Trevor Ridge and AGCSA president Jeff Gambin



Matthew McLeod: Textbook Tiger

Matthew Merrick by the book



Note the signatories


Peter Jans takes aim


Right to left, or left to right


A marriage made in Moama

A sign of the times


A little to the left maybe


Cutting to the chase


Ben Tilley drums his own rhythm at the conference dinner

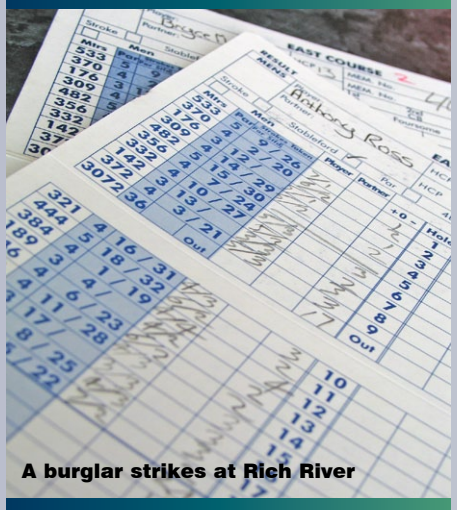
The usual Red Jacket suspects – Cowden, Black, Ridge and Devlin

Shaun Probert shows his paintball battle scars

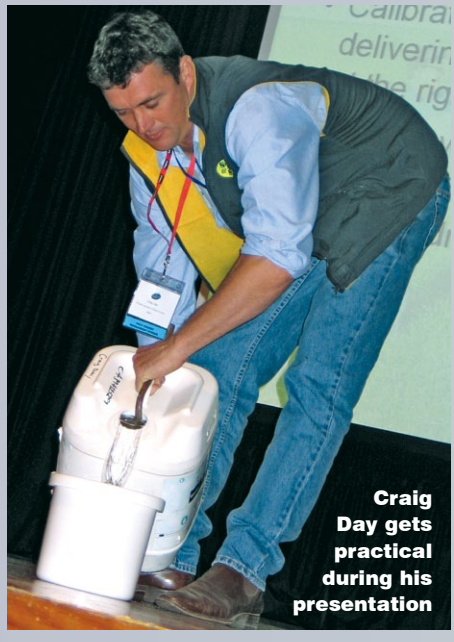
Environmental law expert Carlo Zoppo

Moama memories

Yarrawonga superintendent Michael Swanwick



A burglar strikes at Rich River

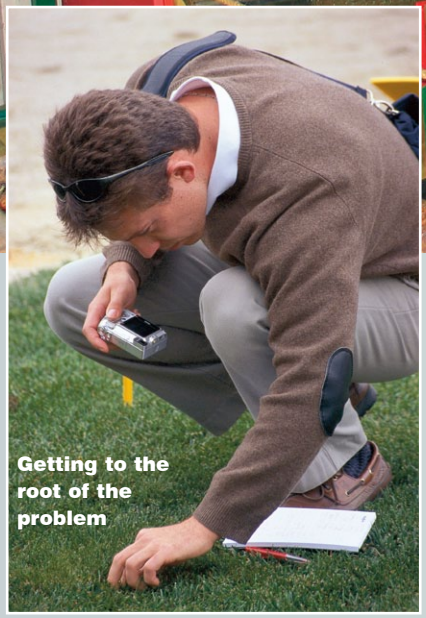


Craig Day gets practical during his presentation

And they're off...

Primed punter


Colin Cowden laments a missed birdie chance


Getting to the root of the problem


On tonight's menu - catch of the day


Talking turf


On the hunt

Toro's unique marketing strategy at the Shamrock

The Australian Turfgrass Conference...

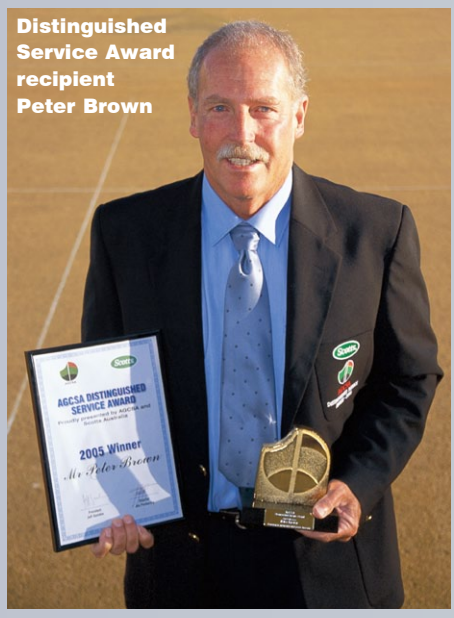
2005 AGCSA Awards – Recognising Excellence

Five new names were etched into the AGCSA's history annals following the 2005 AGCSA Awards at the 21st Australian Turfgrass Conference in Echuca-Moama. For the second time in its history the Claude Crockford Environmental Management Award was shared, while the remainder of the awards went to three of New South Wales' finest. ATM pays tribute to the latest batch of winners.

DISTINGUISHED SERVICE AWARD

Presented in partnership with Scotts

WINNER: Peter Brown



Distinguished Service Award recipient Peter Brown

Moama Bowling Club proved a fitting location as New South Welshman Peter Brown was bestowed the AGCSA's prestigious Distinguished Service Award for 2005.

For the best part of 15 years during his early career, Brown toiled as a bowling greenkeeper, just one of many facets in a long and distinguished career which was recognised in front of his peers at the 21st Australian Turfgrass Conference.

"This is the biggest highlight of my career," Brown said during his acceptance speech. "The AGCSA has meant a lot to me for a long time and I'm humbled to be here and to receive the support and recognition of those who are part of this fine industry."

Over the past 40 years, Brown has experienced more than most, from being an apprentice gardener through to teaching a new generation of turfgrass manager.

Brown's earliest role model was his father who worked as a gardener for the Randwick Council in Sydney. Back then his old man used a scythe to cut the grass and from an early age Brown recalls his aspirations to use the scythe just like his dad.

Brown's desire to be involved in the horticulture industry was quickly realised and he became an apprentice gardener with the same council. During his apprenticeship, Brown got to know the guys at the nearby bowling club. Impressed with what they could achieve, Brown was inspired to follow suit and over the course of the next 15 years plied his trade as a bowling greenkeeper.

During that time, bowls started to decline in the Sydney metropolitan area and as this came about Brown applied for a teaching job at the Ryde School of Horticulture. Brown estimates during his time at Ryde he and the staff turned out around 400 students, among them current AGCSA president Jeff Gambin.

Having helped nurture a generation of turf managers, at the age of 43 Brown stepped out of the classroom and into the assistant superintendent position at The Lakes Golf Club under Phil Knight, his former assistant at Avalon Bowling Club.

Knight eventually moved on and Brown eagerly took the reins and in a 14-year period prepared the highly-regarded course for nine major tournaments, including the 1993 Australian Open won by Steve Elkington.

"Tournaments are terrifying to run," Brown recalled. "They do get a little easier but they do have their differences. You get tremendous kudos and satisfaction but they are a lot of hard work and you can be on a hiding to nothing."

In 1994 Brown oversaw the redesign of all greens, and five years later saw them decimated in the hailstorms of April 1999 that smashed the eastern suburbs sandbelt.

In recent times, Brown completed his Masters degree in 2000 under the guidance of Professor Peter Martin at the University of Sydney. "It was a fantastic experience. I did it for the sake of learning. It was a lot of hard work but the benefits were tremendous."

Most recently, Brown has worked as a consultant and has been seconded by the NSW Department of Environment and Conservation to help it conduct a series of environmental assessments at 30 NSW golf courses.

During his acceptance speech, a clearly emotional Brown paid special tribute to his wife Helen: "She could sit down in any greenkeeping exam and get through with 80 per cent," Brown quipped. "She should probably have an honorary psychology and stress management degree. She has done well to put up with me."

In winning the award, Brown joins a prominent list of fellow New South Welshmen to have won the award, including Professor Martin and Peter McMaugh.

"Peter (Brown) has been a stalwart of the industry for many years, and I, like many other superintendents and turf managers, were fortunate enough to learn from Peter," said AGCSA president Jeff Gambin.

"Peter is an absolute gentleman and he truly embodies what this award is all about – someone who through their actions has made a long-lasting and indelible mark on the turfgrass management profession."

AGCSA CLAUDE CROCKFORD ENVIRONMENTAL MANAGEMENT AWARD

Presented in partnership with Bayer Environmental Science

WINNERS: Ben Marshall and Scott McKay

It was an all Queensland affair in the 2005 Claude Crockford Environmental Award with Ben Marshall (Club Pelican) and Scott McKay (North Lakes Golf Club) sharing the honour. The duo beat home fellow Queensland superintendent Pat Pauli (Horton Park Golf Club, Maroochydore), an achievement which was particularly sweet for McKay on account of having been a beaten finalist last year.

Both courses which Marshall and McKay oversee are located within or near sensitive environmental areas and through careful and precise environmental management techniques both have ensured their course's long-term sustainability.

BEN MARSHALL – CLUB PELICAN

Club Pelican is based in Caloundra and is home to the Australian Seniors PGA Championship and ALPG Players Championships.

In his time there, Marshall has developed an operational management plan that is the foundation of sound environmental management of the golf course. Within that plan objectives have been set for the ongoing maintenance of the course, addressing key issues such as water quality management, habitat management and pest control using IPM techniques. As a result, Club Pelican is currently undergoing certification for the Audubon International Cooperative Sanctuary.

Club Pelican is home to a wide variety of bird species (146), butterflies (30) reptiles (33), amphibians (8), mammals (17) and over 140 plant species throughout four flora habitats.

Club Pelican has designated areas around the course as no mow/no spray buffer zones. These areas are instrumental and form wildlife corridors throughout the course linking Bells Creek to the northern end of the course.

Water quality management is critical to Club Pelican's ongoing environmental stewardship, particularly considering its location on Bells Creek, a feeder to the Pumicestone Passage and ultimately Moreton Bay Marine Park.

No potable water is used on the course. All irrigation water is taken from an extensive ▶

From left, Claude Crockford finalist Pat Pauli, joint winner Ben Marshall, Craig Wood from Bayer Environmental Science and joint winner Scott McKay

Excellence in Golf Course Management Award finalists Brett Chivers (left) and Graham Haynes (right) with 2005 winner Darren Jones and John Deere's Kel Davison

Graduate of the Year finalists Brenton Wenham (left) with Toro's Robert Rein and 2005 winner Damien Bell

man-made wetland covering 31 hectares. This water is harvested from golf course run off and from the surrounding suburb. The course has created extensive wetlands, which are critical to the course as they supply irrigation needs, they are home to many permanent wading and migratory birds; and they support a healthy diversity and number of native fish.

Club Pelican undertakes a water monitoring program, the objective of which is to demonstrate that the physical and chemical character of the course waterways is within targets defined by the Australian and New Zealand Environment and Conservation Council (ANZECC 2000).

Club Pelican has ceased the use of any organophosphates and as part of the Audubon certification process Marshall is undertaking a case study to reduce chemical application through good soil science husbandry.

SCOTT McKAY – NORTH LAKES

As superintendent of North Lakes Golf Club north of Brisbane, Scott McKay has had to deal with a number of sensitive environmental issues while maintaining the Graham Marsh designed 18-hole championship layout.

The course is the major catchment for the North Lakes development, is bounded by the sensitive Salt Water Creek, contains a healthy population of koalas and is home to the very rare and very small Wallum Froglet.

Through the efforts of McKay, his staff and The Golf Course Company, North Lakes is ISO 140001 certified, while McKay has also implemented a number of programs to further improve the course's status as an environmental leader.

One of those is to reduce wetland nutrient levels as water moves through the course's waterways. In doing so McKay is helping to reduce the risk of nutrients building up in wetland areas from fertiliser application, reducing the risks of leaks in the irrigation system leading to nitrification of waterways, and reducing the risk of nutrient build up from adjoining farming properties and construction activities.

McKay is also aiming to reduce the amount of chemical fungicides applied to the course, and is proactive in the area of raising the environmental awareness of the surrounding community and how the course plays an important role in the local environment.

"Responsible environmental management must be sustainable," McKay said. "I would like my son's children to be able to enjoy the benefits of our environmental stewardship and to do this we must set the example for future generations of turf managers now."

2005 FINALIST: *Pat Pauli (Horton Park Golf Club, QLD)*

AGCSA EXCELLENCE IN GOLF COURSE MANAGEMENT AWARD

Presented in partnership with John Deere

WINNER: Darren Jones

When Darren Jones started as superintendent at St Michael's Golf Club in September 2001, he was told by one member that the Ferrari just needed a polish. The Ferrari being the course that is, not the general manager's set of wheels. Since then Jones and his staff have slowly been stripping back that Ferrari and the rewards are starting to show.

"Winning the Excellence in Golf Course Management Award is certainly the highlight of my turf management career," Jones said.

"Having been at St Michael's for only a few years, we have only just touched upon what we ultimately want to achieve. The real potential of the club has remained unharnessed for a long time and members and visitors alike are now starting to see the vision that has been generated through good planning and a supportive board."

Since arriving from Royal Sydney Golf Club, Jones has set in place a comprehensive 10-year master plan for the Little Bay course. Among the major works planned are continual tee reconstruction and fairway drainage, a complete new irrigation system, as well as the construction of a much-needed maintenance facility. In 2007 and 2008 Jones and his staff will also undertake the complete reconstruction of all greens, including greenside bunkers and surrounds.

When Jones joined St Michael's, the club had been working to a major works program

which included the installation of concrete pathways, major drainage works and a new pond, while the 1st and 10th greens were also earmarked for resurfacing.

On early consultation with senior ground staff concerns were raised that the works were spreading labour too thinly and that regular maintenance was lacking. It was decided that the two greens would still be manageable and the money saved used to purchase much-needed machinery and reconstruct tees on 1, 3, 5 and 15.

Before starting any tee constructions, several issues needed to be addressed. Works already done had raised concerns with Randwick Council, NPWS and the Aboriginal Land Council. The main concern was that the club was failing to comply to legislative conditions applied to the endangered Eastern Suburbs Banksia Scrub, of which the course has some of the best and largest examples.

As a result, Jones developed a five year plan detailing all works to be undertaken to satisfy the authorities. The document was developed by early 2002 and now outlines work through to 2012.

Water restrictions have also proved a challenge. A bore located near the maintenance facility was deepened from 150m to 209m, somewhat of a pioneering feat as few bores had been attempted in the area. From 0.8l/s the bore now provides 2.5l/s.

There is also a ground water purification system that will be up and running by November 2005 at the old ICI site located at Botany. This $130 million system utilising exosmosis will produce up to 7M per day of high quality water that may possibly make it to St Michael's and other courses in the area.

2005 FINALISTS: *Graham Haynes (Armidale Golf Club, NSW) and Brett Chivers (Keysborough Golf Club, VIC).*

AGCSA GRADUATE OF THE YEAR

Presented in partnership with Toro

WINNER: Damien Bell

The job offers were coming in thick and fast for promising greenkeeper Damien Bell after he walked away with the Graduate of the Year Award for 2005. The 23-year-old from Wellington Golf Club beat the strong challenges of fellow finalists Tim Perrett (Royal Melbourne Golf Club, Victoria) and Brenton Wenham (Willunga Golf Club, South Australia) to claim the award for New South Wales.

"This is a great honour for me," said Bell, who secured his place as a finalist after being named the NSWGCSA 2004 Trainee Greenkeeper of the Year. "Being from a small country course my expertise is limited, but I have now whetted my appetite and am keen to further expand my knowledge. This award will be a tremendous boost for my career."

If there is one quality that shines through about Bell, it is his exemplary worth ethic. Bell has worked under superintendent Graham Parkes at the Wellington Golf Club for the past four years and together the two are responsible for the upkeep of the 18-hole course.

During that time Bell has undertaken a turf management degree and is currently studying for his Certificate IV in Horticulture. As well, Bell holds down an after hours job as a bartender at the Wellington Hotel.

In his time at Wellington, Bell has constructed a new G2 bentgrass turf nursery and has also played a major role in the construction of two new tees.

A real test of Bell's character came in September 2003 when Parkes was badly injured in an accident at home, forcing him out of work for seven months. Bell was left to look after all maintenance procedures, including renovations, giving him the chance to demonstrate to Parkes what he had taught him. "I learnt so much in those months and it changed me immensely," Bell said. "I became more mature and learned to be more tolerant of others."

The opportunities are now endless for Bell. Last year's winner Craig Webley spent two months earlier this year at the Winter School for Turf Managers at the University of Massachusetts, while 2003 winner James Dalton has spent the best part of 2005 working at St Andrews, helping prepare the course for the 2006 Open Championship.

AGCSATech Update

BY JOHN NEYLAN

Before shooting off to Wales for the International Turfgrass Society conference in July, AGCSATech manager John Neylan attended the New Zealand Turf Conference. In this instalment of AGCSATech Update, Neylan reports on his trip to Christchurch and looks at hydraulic conductivity as a means of soil selection.

I had the pleasure of attending the recent New Zealand Turf Conference in Christchurch and it was like visiting an old friend. There were many familiar faces and it reinforces how close Kiwis and Aussies are despite the rivalry on the rugby field. Our closeness is such that we are prepared to claim Russell Crowe and desperately try to make an Aussie of him and US Open winner Michael Campbell (he lives in Sydney apparently).

From a turf management perspective, the issues are the same. In particular, expectations are continuing to challenge the practicalities of meeting these expectations. Whether it is a golf course or a sportsfield, the challenge is how to maintain a high standard while there are increasing pressures on budgets and resources.

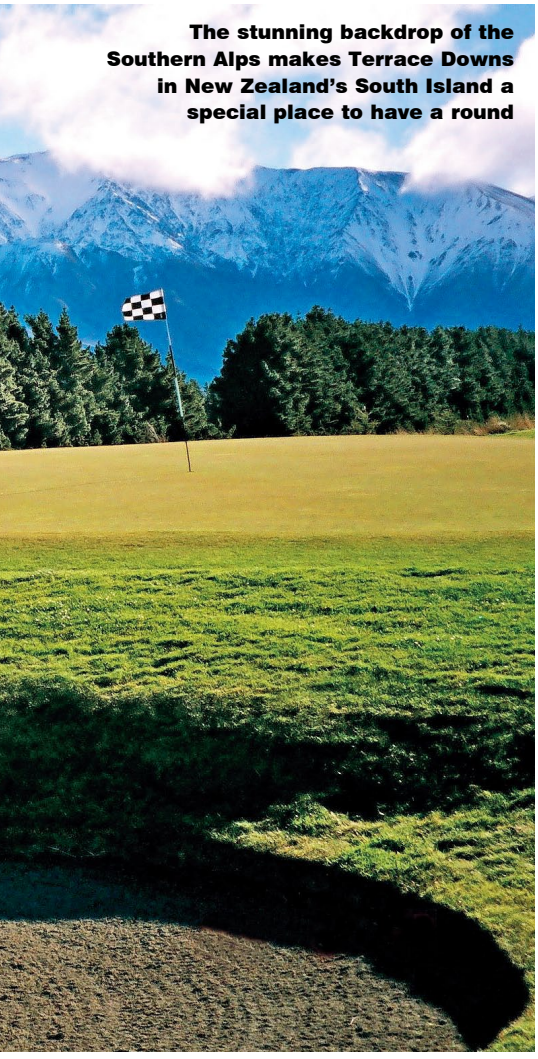
One of the papers presented at the conference concerned the effects of thatch and organic matter accumulation on turf health and surface quality. Thatch is a universal problem, particularly when dealing with the new high density bentgrasses and it was interesting to hear about some innovative New Zealand studies.

The studies that have been done by Alex Glasgow of the New Zealand Sports Turf Institute have demonstrated that once the organic matter content exceeds 3.5-4.5 per cent by weight, there is a significant reduction in macroporosity.

Once the organic matter exceeds 4.5 per cent by weight there is insufficient sand to maintain adequate porosity. Macroporosity, or the large pore spaces, are the critical pathway for water infiltration, drainage and air movement.

Where organic matter becomes dominant, moisture is trapped near the surface, the putting surface becomes soft, black layer forms and there is deterioration in root growth. Where thatch becomes excessive it will undo all the benefits of having a well drained sand profile.

Andy Wood, superintendent from Kauri



The stunning backdrop of the Southern Alps makes Terrace Downs in New Zealand's South Island a special place to have a round

Cliffs, a course located in the far north of New Zealand, spoke about the procedures he employed to overcome a thatch problem. The greens were hollow cored with large tynes at a 25mm x 50mm spacing, which affected about 15 per cent of the surface. It did make the surface very soft. The greens were topdressed and in order to completely fill the holes with sand, the sand was watered in by hose.

The greens were also scarified using 6mm blades down to a depth of 18mm. The slits were cleaned out using blowers and then topdressed.

When I listened to this presentation and reflected on some recent experiences, it reinforced the value of sand dusting to control thatch. With the increasing pressure to minimise surface disruption and inconvenience to golfers, a dusting program that starts from day one can reduce the need for more disruptive techniques.

It is also interesting that where thatch is an issue and the renovation program is inadequate, the playing surface will quickly deteriorate. The message is – start dusting immediately after a turf cover is achieved.

NEW ZEALAND GOLF COURSES

With the conference being held in the South Island, we were able to visit two contrasting golf courses tucked under the Southern Alps.

The first was Methven Golf Club, an 18 hole parkland golf course with Mount Hutt as a backdrop. This golf course is wall to wall browntop bent and is maintained by a staff of two. It is a typical rural golf course that is well maintained and a real credit to the staff.

The second course we inspected was Terrace Downs. The winds howl down the snow capped mountains and the chill factor definitely adds to the test of golf. The superintendent, who is from the UK, suggested that it was a relatively good day?! He did admit that the weather was a major challenge for the staff.

Terrace Downs provides some spectacular views of the mountains, river and the terraces that have been carved into the hillside by the meandering river. Browntop bent is again the dominant species and the golf course is very well presented.

HYDRAULIC CONDUCTIVITY AS A MEANS OF SOIL SELECTION

During some recent consultancies, we have been required to review the results of soil physical analysis as undertaken by other laboratories.

The parameter of particular interest has been the hydraulic conductivity and in particular what is an acceptable upper limit. Some laboratories are recommending that a hydraulic conductivity greater than 600mm/hr renders the sand unsuitable for use. The inference is sometimes drawn that a high hydraulic conductivity will result in a low volumetric water content. This presumption is incorrect.

The drainage rate of a sand or soil is primarily controlled by the large pore spaces (macroporosity) where as volumetric water content is controlled by the smaller pore spaces.

In assessing a sand for construction purposes, there are several parameters that need to be measured, including particle size distribution, hydraulic conductivity, volumetric water content and aeration porosity.

In my opinion, as long as the hydraulic conductivity meets a prescribed minimum, volumetric water content and aeration porosity are more important. In fact the USGA guidelines for golf green construction now recommend that the hydraulic conductivity be greater than 150mm/hr. There is no upper limit.

Obviously where the hydraulic conductivity is very high, the leaching of nutrients is a consideration. In some situations where the hydraulic conductivity is very high, the addition of organic matter will reduce the drainage rate. However, this should not be at the expense of increasing the volumetric water content beyond the acceptable range.

As we continue to recommend, when selecting a sand for construction, test and select based on all the parameters.

EXPECTATION VERSUS PRACTICALITY

As I move around various golf courses and sporting venues, the current theme is that there are very high expectations for all turf surfaces. While expectations and goals are extremely important in developing quality and safe surfaces, the expectations are often greater than the practical realities.

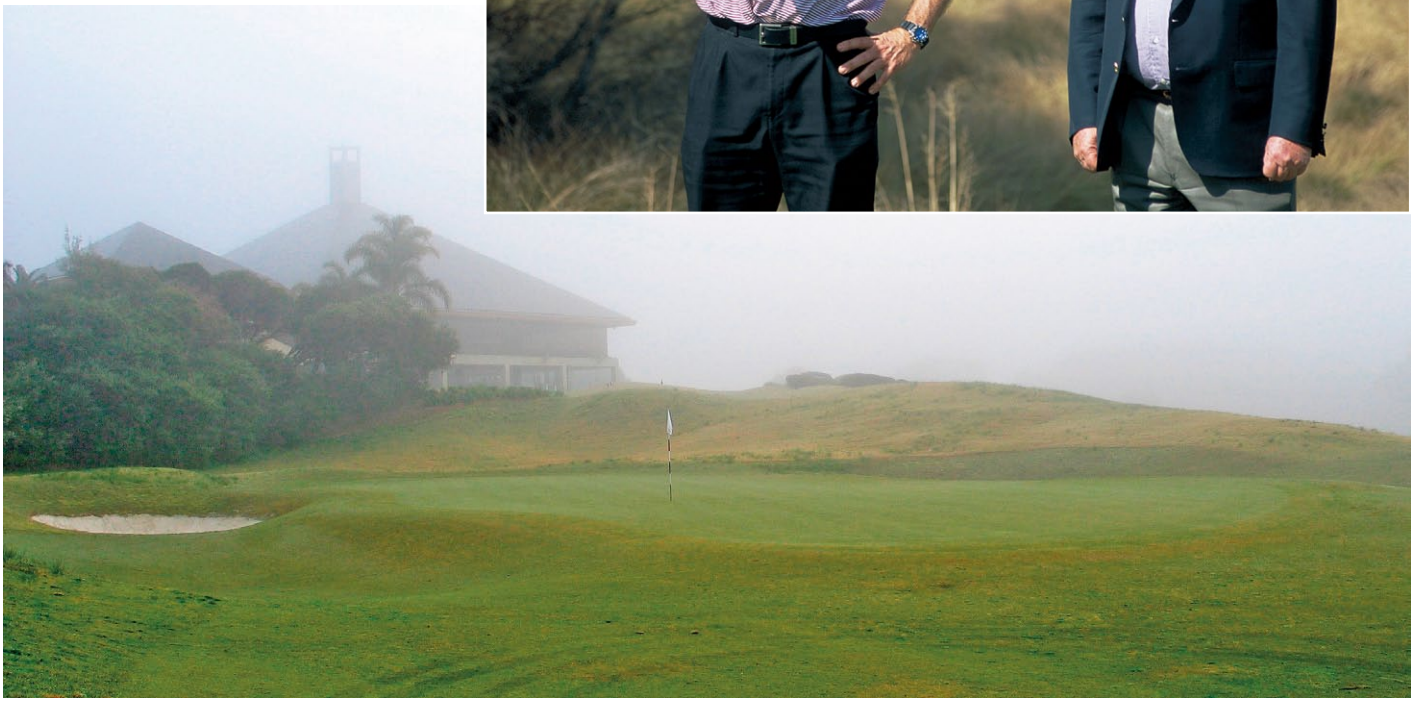
It is apparent that turf managers have become so skilled at preparing high quality surfaces that there is very little tolerance for even minor imperfections. In some respects they have almost set the bar too high for themselves and created unrealistic expectations.

Methven Golf Club is also blessed with amazing scenery

BY JOHN NEYLAN

Right: Robert Ashes and Colin Phillips discuss tactics before last year's Australian Open. Ashes has resigned as superintendent at The Australian

Below: The par 3 10th at The Australian



As we move deep into winter (and it is usually in mid to late July that most turf areas are at there worst) comments are often made about thin lies, slow and soft greens, wear areas, spots of *Poa annua* and discoloured turf. These are often the consequence of a change of seasons and when you add in wet weather and low rates of evapotranspiration, there is little the turf manager can do.

The question is how do we establish realistic expectations? Benchmarking is regularly raised as a means of comparing turf areas over time and establishing performance standards.

In any such exercise, the first challenge is to establish the needs of the user. Once the needs are established, then it is possible to determine whether the turf system (ie soils, drainage, turf types) can achieve such a standard and if the resources are available.

Each site is different and it is important to determine what is achievable for that site. Care has to be taken not to expect the same quality as the facility down the road without knowing all the contributing factors, both site and resource availability.

LEADING LIGHTS

The turf industry has many characters and leading lights. Listening to Peter Brown's presentation following the presentation of the AGCSA's highest honour – the Distinguished Service Award – again highlighted the great people involved in the turf industry.

Two people that I have known for many years deserve recognition for their contribution to the turf industry. The first of these is Robert Ashes who recently resigned as course superintendent of The Australian Golf Club.

Rob has been a great greenkeeper at one of Australia's most prestigious courses and in his 20-plus years there he has maintained the highest of standards and hosted several major tournaments including the 2004 Centenary Australian Open.

Having worked with Rob at various times over the years and in particular in the lead up to last year's Open, he has always been forthright, honest and uncomplicated in his approach to maintaining turf.

Rob was one of the very first superintendents to initiate an effective dusting program and to resurface all the greens to one of the new bentgrasses. Now that he is moving on, I wish Rob all the best in his future endeavours.

The other person that deserves acknowledgement is a Kiwi! David Howard is New Zealand's leading turfgrass agronomist and has just celebrated 25 years with the New Zealand Sports Turf Institute.

David is very knowledgeable and is also very practical and his knowledge and good humour has earned him great respect among his peers. I have always enjoyed his company and on more than one occasion he has amazed me with his depth of understanding of grass and weed taxonomy.

Well done David – can you survive another 25 years?

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Back in black

Black layer within putting green rootzones can be a common problem for the superintendent or turf manager. In this instalment of Tech Talk, Andrew Peart revisits the causes and symptoms of black layer and management techniques that can be employed to negate its impact.

The phenomenon of black layer is not new, but surprisingly it remains a significant problem. It can affect all soil types but is typically a symptom where poor drainage, compaction and waterlogged soils combine to deplete available soil oxygen.

Black layer occurs primarily due to a lack of available oxygen (anaerobic soil conditions) within the rootzone. The lack of oxygen is often a result of a combination of compacted, waterlogged soil conditions. As oxygen becomes depleted the soil conditions change from oxidising to reducing (see Table 1).

As the soil chemistry changes, microbes that can use alternatives to oxygen for respiration begin to prosper. The first group of microbes are those that can utilise nitrate (NO_3^-), with the result that the denitrification of the soil begins with nitrate being reduced to nitrite (NO_2^-). Organic matter is used to power this reduction process and therefore it tends to be more severe where thatch levels are greater.

As this process continues, nitrate availability is reduced due to its reduction to nitrites but also the levels of soluble manganese ($Mn^{2}+$) and iron ($Fe^{2}+$) increase (Smith, 2001).

The tell tale sign of waterlogging within the profile is the presence of orange brown staining where the iron in solution from the reduced state has oxidised to form iron oxide once aerobic soil conditions have returned.

If waterlogging continues and the aerobic conditions are not returned, sulfate (SO_4-) is then reduced to hydrogen sulfide (H_2S). Hydrogen sulphide, known as rotten egg gas, is toxic to plant roots at high enough levels. Initially, however, the gas will react with soluble iron within the profile to form the insoluble iron sulphide (FeS) that causes the black colouration of the affected area. Iron is usually freely available due to the natural increase in soluble iron in anaerobic environments.

When the majority of soluble iron has reacted with the available hydrogen sulphide to produce iron sulphide, concentrations of hydrogen sulphide gas then increase within the rootzone, eventually becoming toxic to plant roots.

Smith, 2001 states if you are unsure whether there is black layer within the soil profile a simple test can be undertaken to determine it. To test the soil, place 10ml of suspect soil in a glass jar or plastic container and mix it with 10ml of dilute hydrochloric acid.

Once mixed, undo the lid and smell the gas; if it smells like rotten egg gas (hydrogen sulphide) this indicates iron sulfides are present in the soil profile and black layer is present. Iron sulphide is soluble in hydrochloric acid and releases hydrogen sulphide gas.

PREVENTION

Like many disorders within the turfgrass environment, black layer is certainly one phenomenon where prevention is better than cure.

1. The first aid to prevention of black layer is the initial design of the putting green and the surface contours within it. The design should allow surface water to run off the putting surface rather than collect within a hollow of the green.

2. The green must contain enough areas for sufficient pin placements to reduce areas of compaction that may occur. Compaction may also occur if there is only one main exit from the green and this again should be avoided within the initial design.

3. Rootzone placement must be sufficient

with uniform depth to avoid exacerbating the likelihood of waterlogged regions within the profile.

MANAGEMENT

The most important management criteria if black layer has occurred is to return the soil from a reducing state to an oxidising one, and this can only be achieved through aeration. Negligible oxygen within the rootzone has caused the formation of black layer which in turn limits turf growth.

Aeration will allow oxygen back into the rootzone and also aid loosening the soil profile to reduce compaction. Ideally aeration should be undertaken by hollow coring with large diameter tynes to physically remove as much material as possible and introduce unaffected sand. It is imperative that the tynes penetrate the depth of the black layer to ideally create a continuous channel to the unaffected sand below.

By creating channels of sand through the profile this will encourage better drainage within the top portion of the profile and reduce the likelihood of waterlogging within the thatch/rootmat layer. The topdressing sand however should be compatible with the underlying material to prevent layering from occurring.

Light topdressing or dusting will help increase oxygen at the surface and also dilute the thatch accumulation while also encouraging the breakdown of this organic matter. In pure sand rootzones it is often within the thatch /rootmat zone that the black layer is witnessed indicating its ability to hold onto high volumes of water if not adequately diluted with regular topdressing events.

The use of sulphur based fertilisers is often seen as a catalyst for the development of black layer. However, Goss 1987 states that hydrogen sulphide can be produced without the addition of any elemental or extraneous sulphur applications.

Most of the soils sulphur is held in reserve in organic matter and is released during the breakdown process. Sulfide ions can also interact with iron and other micronutrients to form insoluble sulfides.

CONCLUSION

Black layer is primarily a result of a lack of oxygen that is exacerbated by waterlogged and compacted surfaces.

However, as seen in many new greens constructions the formation of this black layer is often confined to the upper portion of the rootzone that contains a high percentage of thatch.

With the game of golf continuing to become more popular and increasing numbers of rounds being played, routine renovation procedures are being squeezed out in favour of more rounds on undisturbed putting surfaces. Unfortunately this is often to the detriment of the overall quality of the putting surface and in some cases its long-term viability.

The preventative measures and remedies for black layer are regular renovation work that involves aeration, dusting, hollow coring and topdressing that will alleviate waterlogged conditions.

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Smith, J. 2001. *Managing Black Layer. Golf Course Management 69 (12): 59-62.*

Goss, R. 1987. *Managing Anaerobic Soils. USGA Green Section: July/Aug:12-13.*

Table 1.

Redox reactions in waterlogged soil

Days after water-logging	Increased severity of reducing conditions	Approximate soil redox potential	Redox couples	Implication on soil chemistry status
Day 1 Soil oxygen disappears		+800 mV	O_2 ⟷ H_20	Normal aerobic respiration
Day 2 Nitrates disappear		+400 mV	NO_3 ⟷ NO_2	Denitrification begins
Day 4 Reduced soluble iron increases		+200 mV	Fe^{3+} ⟷ Fe^2	Reduction of iron oxides to Fe^2
Day 12 Hydrogen sulfide produced resulting in black layer		-200 mV	SO_4^2 ⟷ H_2S	Onset of production of metal sulfides

Courtesy: Smith J. (2001)

More resources are expended on fungicides to control dollar spot than any other in the USA

Diversity and biology of the dollar spot organism

The control of dollar spot can be a costly and time-consuming exercise for the superintendent and turf manager. US researchers conducted a study on the biology and diversity of the dollar spot organism *Sclerotinia homoeocarpa* to increase the knowledge base of the organism with a view to improving control and management of the disease.

Dollar spot disease, caused by *Sclerotinia homoeocarpa*, is intensively managed by fungicide applications and to a lesser extent by cultural practices. Probably more resources are expended on fungicides to control this disease than any other in the USA.

Pest control frequently is managed efficiently and economically by an extensive knowledge of the biology of the pathogen, including an understanding of its genetic diversity. However, this is not the case with *S. homoeocarpa* in many respects.

The disease has an unusual cycle of development in that it remains quiescent for most of the year and then suddenly develops as an explosive epidemic. There is no documented reason why the observed disease develops explosively, nor is there solid data on where the pathogen is, or its state, when the disease is not evident.

There is an assumption that the pathogen overwinters on diseased turf but solid data on this is lacking. However, in our view, this information is critically important. We will present information suggesting that the initial stages of the disease occurs in widely scattered areas with slight disease symptoms, but that the explosive stage of the disease occurs because tissue from a few infected plants is mechanically spread by mowing or similar processes and that this gives rise to the typical dollar spot epidemic.

If this is true, then control of this initial stage might provide economical means to eliminate or minimise the expensive process of repeated application of fungicides. In other words, it may be possible to control the disease while it still is nearly invisible and avoid its epidemic phase.

Further, knowledge of the genetic diversity of the pathogen is quite important. For example, if the organism is quite diverse then the pathogen in different sites or areas may respond differently to fungicides or management systems.

Further, numerous programs are breeding for resistance in turfgrass to the pathogen. There is at least a theoretical risk that breeding programs that develop varieties resistant to a narrow range of isolates may produce varieties that will respond differently, i.e., be less or more resistant to strains of the pathogen in an area from which they were not tested.

It was the goal of our research program to investigate the biology and diversity of *S. homoeocarpa* to discover those variables that are important to the management of dollar spot.

One of the most important issues to us was the location of the pathogen when the disease is not epidemic. We also were interested in the first infection foci. The Compendium of Turfgrass Diseases (Smiley, Dernoeden, and Clarke 1992) states that “the dollar spot fungus survives unfavourable periods as mycelia in infected plants and as stroma on foliage surfaces”. However, most turf pathologists regard this statement as unproven.

Further, there is little or no information on the events at the beginning of the disease cycle that precede the explosive development

of the pathogen. We therefore set up a series of experiments designed to answer these questions.

METHODS AND MATERIALS

INOCULUM SOURCE ADDED TO SITES

We expected that we would be able to follow the disease cycle if we added the pathogen at high levels in systems we could monitor. We therefore separately placed a) dollar spot-infected turf leaves and b) heavy growth of the pathogen on autoclaved wheat seeds in nylon mesh bags (4x2cm, 75 micron openings) that were closed with a heat sealer.

In the spring of 1998, we placed the bags with inoculum in three different soils/conditions: a sand research green and a soil research green, both at the Cornell University Turfgrass Research Facility, and a fairway at the Robert Trent Jones Golf Course in Ithaca, NY. (pictured right) Fungicides were not applied to these areas.

A total of 26 bags were placed in the turf that contained the wheat inoculum and 52 that contained infected turf inoculum. We recorded the disease that arose from the inoculum both before and during the time when the epidemic occurred elsewhere in the plot. We also recovered the bags and attempted to isolate the pathogen from them over the course of the summer and into autumn.

NATURAL INOCULUM STUDIES

It seemed to us that if the infected tissues from the previous year were the source of epidemics, that dollar spot patches in succeeding years should begin near the sites where patches were the previous year. Conversely, if this pattern was not the case, then other sources of inoculum gave rise to the disease, or at least the likelihood of any specific old patch site giving rise to new disease is rare.

To investigate this, we placed golf tees at the centers of patches and in apparently healthy turf. In the summer of 1999 we marked a total of 12 diseased patches and eight healthy sites in four separate areas of the turf. We also marked another three healthy and three diseased sites in the summer of 2000. The next year, each of the sites was rated as to whether or not there was a dollar spot patch at the golf tee site.

We also attempted to isolate the pathogen using standard microbiological media from the centers and the edges of the plots. Separate isolations were attempted in the root, crown and leaf areas. Different parts of the plant ▶

It was the goal of Cornell University researchers to investigate the biology and diversity of the dollar spot organism *Sclerotinia homoeocarpa*

were surface-sterilised or not and were ground or not. There were well over 100 attempts to isolate the pathogen.

ARTIFICIAL INOCULATION OF BENTGRASS SEEDLINGS

We followed the pattern of infection of seedlings after inoculation with artificial inoculum. Using established methods (Lo, Nelson, and Harman 1996), seedlings of 'Pencross' bentgrass were established and then inoculated by placing inoculum of the pathogen in a corner of the flat. The disease progressed from these sites.

The seedlings were examined microscopically following clearing and then staining with trypan blue, which specifically stains fungal structures (Tuite 1969). Hyphae of the pathogen were easily seen as robust dark hyphae.

RESULTS

INOCULUM ADDED TO SITES

No disease ever developed near buried bags that contained artificially infected bentgrass. Disease did develop near bags that contained wheat inoculum just after placement but no disease developed thereafter, including at the time of the natural epidemic.

There was no obvious growth of the pathogen from or on the bags that contained the bentgrass inoculum but the surface of the bags containing the wheat inoculum were covered with a heavy black rind, or stroma, of the pathogen. We could not isolate *S. homoeocarpa* from this rind but fungal cultures did grow from the residual wheat material.

These cultures were small and not recognisable as the pathogen at first, but many of them underwent a phase shift from the slow growing type to rapid growth characteristic of the pathogen. Thus, the organism clearly existed as two separate growth types, the first being unrecognisable as *S. homoeocarpa.* Such phase shifts occur in other fungi.

NATURAL INOCULUM STUDIES

There was no association whatsoever between the location of dollar spot patches or healthy turf in one year relative to the sites of patches the succeeding year. This suggests strongly that the infections in the succeeding year did not arise directly from the inoculum from diseased sites the preceding year.

We were unable to isolate the pathogen from any part of the killed turf in the centers of patches regardless of the method of sample preparation or whether or not we surface-sterilised the tissues. Similarly, the pathogen could also not be isolated from the root-soil zone in killed plants at the center of patches.

We were not, however, able to develop a selective medium for the pathogen because saprophytic fungi, especially Trichoderma, frequently developed. These known biocontrol fungi might have prevented identification of the slow-growing phase of the pathogen that was obtained from the centres of the wheat inoculum bags. It is likely, however, that we would have been able to isolate and identify the rapid-growing phase if it was present.

However, the pathogen was easily and reliably isolated from diseased, but still green, leaf tissue at the edge of the patches. These isolates were all of the rapid-growing phase. Thus, our methods of isolation were clearly able to detect and isolate the rapid-growing phase of the organism.

ARTIFICIAL INOCULATION OF BENTGRASS SEEDLINGS

Microscopic observation of seedlings from artificial inoculation always demonstrated the presence of the pathogen in the root and crown region of the plant, but never in the leaves. This is in marked contrast to the situation in the epidemic phase of the disease, where lesions typically occur on the leaves (Smiley, Dernoeden, and Clarke 1992).

"These results call in to question many of our assumptions about dollar spot disease"

Therefore, we also examined young lesions on leaves during the epidemic phase of the disease and were readily able to identify the typical hyphae of the pathogen.

DISCUSSION

These results call in to question some of our assumptions about dollar spot. First, the natural inoculation studies suggest that the patches that arise in one year did not result directly from infections that occurred the preceding year. If the patches in the second year arose directly from the previous year's inoculum they should have been located at similar sites.

A possible reason for the lack of inoculum from first-year patches giving rise to those in the second year is suggested by lack of viable isolatable pathogen from dead, diseased turf in the centres of dollar spot patches.

Second, there is a suggestion from the wheat inoculum studies that the pathogen exists in different phases. One of these may be more pathogenic than the other, but much more needs to be done before any conclusions can be made in this regard.

If the pathogen in killed tissue reverts to the slow growing phase, this might explain our inability to isolate the pathogen from the dead parts of patches relative to our abilities to isolate from the still-green but diseased tissues.

The observation that the artificial inoculation results in infection of a different site of the plant than that observed in the field is also surprising. All of these observations suggest that there is much more to be learned about the biology of this pathogen.

From a practical point of view, a very important consideration is the concept that the disease we observe during the epidemic phase of the disease, and that is so difficult and expensive to control, is in reality the second phase of the disease.

The first phase would be the initial establishment of the disease, perhaps in only a few places in the turf area and conceivably in the root and crown region. Then, and especially in close-mown turf such as that on golf greens, this infected material could be spread as infected turf tissues throughout the site. Such initial inoculum ought to be highly infective since it would be present in damaged grass particles that are highly nutritious to the pathogen.

If the idea that the epidemic phase of dollar spot results from secondary spread of an initial phase with few symptoms then the epidemic could be controlled before it starts. One 'shot gun' method might be to start fungicide applications a month earlier than the epidemic is expected at a particular location and then conclude spray applications if the dollar spot epidemic does not develop. This could be timed with weather data and other epidemiological forecasting systems.

An even more satisfactory, albeit long-term, solution is to use modern molecular marking techniques to identify and follow the pathogen and thereby learn its basic biology. Such marking techniques could employ both toxicant resistance and visual markers such as green fluorescent protein and should permit specific identification and isolation of the pathogen in controlled lab and field situations

and thereby overcome the limitations of the study we report here.

Of course, the basic science that could be learned in such studies ought to be invaluable both for basic science and for improved, more environmentally friendly and less costly disease control.

PATHOGEN DIVERSITY

There are differing opinions as to the degree of genetic differences (diversity) between strains of the pathogen. Powell and Vargas suggested *S. homoeocarpa* is a single species with differing vegetative compatibility groups (Powell and Vargas 2001) while Kohn (Kohn 1979) suggested that the pathogen might include different species.

Conversely, others have suggested that there is limited diversity (Deng, Melzer, and Boland 2002; Hsiang and Mahuku 1999; Hsiang et al. 2000) but these studies were conducted primarily on strains from a single geographical location (Ontario, Canada).

If the pathogen is highly genetically diverse, then management systems probably will be more difficult than if diversity is small. High levels of diversity may provide greater differences in innate or developed resistance to fungicides, different responses to management practices and different responses to changes in the genetics of turf, including differing responses to putatively resistant cultivars.

A possible consequence of the last point is that turf varieties developed to be resistant in one area or to a narrow range of isolates of *S. homoeocarpa* may be susceptible to strains not tested.

METHODS AND MATERIALS

We first made a concerted effort to gather isolates through USGA networks and Cornell resources so that we would have a substantial amount of diversity based on geography and on host plants from which the isolates were obtained.

The principal method of examining the genetic diversity was based on differences in DNA similarities using Random Amplified Polymorphic DNA (RAPD) analyses. In this process, DNA is isolated from the organism (in this case each separate strain of *S. homoeocarpa*) and then subjected to Polymerase Chain Reaction (PCR) amplification with known sequences of DNA as random primers.

In PCR, the primers bind to sections of the test DNA (template) to which they are identical or nearly so. From the primer region, the enzyme DNA polymerase duplicates the DNA to give a double-stranded chain. This is heated for a few seconds to separate the new strand of DNA from the existing template and then cooled. Then, the primers not used in the previous cycle will bind to the newly produced DNA to start a new copy cycle.

After a few cycles of this reaction, specific DNA segments are produced. If the primer sequences are fairly commonly found in the target DNA, then a series of DNA fragments will be produced that are of different sizes that can be separated using gel electrophoresis. The more two strains are closely related the more the fragment pattern will be alike. The degree of similarity between patterns (and thus between strains in a collection) can be ▶

Dollar spot on a bentgrass green indicating the appearance of dollar spot patches that develop rapidly in the absence of control measures

evaluated using statistical procedures.

In this study, we used two different primers (TTGAGCCACCC and GGTCAACCCT). The full methodology is reported in (Harman et al. 2005).

RESULTS

Our strain collection gave a relatively high degree of diversity based on phylogenetic analysis. In fact, the strain collection divided into two separate groups that appeared to be geographically grouped. Strains in clade 1 were found in the western and southerly states of our sample area (NE, MI, KY, NC) and those in clade 2 were found in the northeastern USA and Ontario, Canada. Some strains from clade 1 were also found in NY, MA and NJ.

Clearly, the collection we assembled is too small to draw firm conclusions - more strains from each area should be assessed. However, these data suggest (a) that there is significant diversity in the pathogen and that (b) some types of strains may be more adapted to particular areas than are others.

This data is somewhat at odds with conclusions from other research groups, where the diversity has been suggested to be small (Hsiang and Mahuku 1999; Hsiang et al. 2000; Raina, Jackson, and Chandlee 1997). However, these results were primarily with strains from a limited geographical area, either Ontario, Canada, or Rhode Island.

Our results especially with strains from Ontario, suggest that diversity in that region is indeed limited, but that when the entire Midwestern USA, north-central and northeast USA and Ontario are included, the diversity is larger than has been earlier suggested.

Further, Hsiang and Mahuku (Hsiang and Mahuku 1999) have suggested that those populations within particular regions or sites may have been derived from small founding populations. Our results supported this conclusion.

For example, we collected several strains from two different greens at the Cornell Turf Research area. Three strains from a new sand green were genetically quite similar and were in clade two, while two strains from an older soil green were also similar to each other, but in clade one. Therefore, isolates from each green were similar to each other but quite different from the strains from the other green.

If these conclusions are correct, then probably (a) the pathogen is being introduced into greens at the time of establishment by unknown means and (b) that the pathogen is not native or endemic prior to green establishment. If so, and if the source of infection could be ascertained, then it might be possible, through sanitation, to avoid infection from occurring.

This no doubt would be difficult given the spiked foot traffic that occurs on golf courses, but if it could be managed, it would provide better playing surfaces at lower costs than presently is the case. For example, so far as we are aware, the presence of low levels of the pathogen on turf seeds has not been examined.

CONCLUSIONS AND SUMMARY

The results of this study suggest that much more knowledge regarding the biology and diversity of the dollar spot pathogen could result in less disease, which would result in better playing surfaces at less cost to golf course managers. Items needing specific attention include the following.

1. What is nature of the structures by which *S. homoeocarpa* survives when it is not in its epidemic phase? For at least some of this time, environmental conditions would seem to be favorable for disease development.

2. Why does the epidemic phase of the disease appear suddenly and then diminish?

3. Is there an early, unrecognised phase of the disease and is the dollar spot disease as we know it caused by spread from an initial source with few symptoms?

4. If so, can we intercept the disease before it becomes epidemic? This would reduce disease, increase turf quality and reduce environmental and financial costs associated with current disease management practices.

5. How much genetic diversity is there within *S. homoeocarpa*?

6. Are there geographic adaptations/ differences in the pathogen population in different regions?

7. If there is substantial diversity, is there reason to suspect that different pathogen types will differ in their resistance to new fungicides or that they may overcome resistance in new turf varieties?

8. Is the pathogen introduced into new golf course sites when it is not present in the region naturally? If so, can the source of infection be identified and controlled? If so, this also would reduce disease, increase turf quality and reduce environmental and financial costs.

ACKNOWLEDGEMENTS

G. Harman and K. Ondik are from the Departments of Horticultural Sciences and Plant Pathology, Cornell University, Geneva, NY 14456; E. Nelson is from the Department of Plant Pathology, Cornell University, Ithaca, NY 14853; B. Giuliano Garisto Donzelli is from the Boyce Thompson Institute, Ithaca, NY 14850 (3rd author).

A full list of references can be obtained from the AGCSA. The AGCSA is grateful to the authors and the USGATERO for allowing the publication of this article in Australian Turfgrass Management. USGATERO, (4)4; February 15, 2005.

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The extreme effects of salinity on couchgrass

Salinity tolerance among modern couchgrass cultivars

University of Arizona professor Ken Marcum, who is currently in Australia as the University of Melbourne's visiting scientist for 2005, provides a summary of his research to determine relative salt tolerances of 35 modern couchgrass cultivars.

Water shortages are occurring throughout Australia and the USA due to rapid urbanisation and drought. Resulting limited water supplies are causing states and municipalities to implement turf and landscape water conservation policies (1).

With 30 to 50 per cent of total urban water consumption being utilised for landscape irrigation, governments in both countries are requiring use of recycled, or other saline secondary water sources for turf landscapes (2-4). Therefore, the need for salt tolerant turfgrass cultivars is ever-increasing.

Couchgrass (*Cynodon spp*.) is the most commonly utilised warm season turf in the world, and this certainly remains true in Australia and the USA (5). There are a number of reasons for this:

- Unexcelled turf quality attributes. These attributes include shoot density, leaf texture, and rapid recovery from injury, due to aggressive rhizomatous growth. Rapid recovery makes it the top choice for sports venues, and when overseeding (oversowing) is practiced.
- Unexcelled drought tolerance and water use efficiency. Due to its origins in arid South Africa, the genus is highly tolerant to drought and is water-efficient, having a low water requirement. Therefore, couch is almost exclusively used in warmer regions of the western USA where water is at a premium.
- Good salt tolerance. *Cynodon spp.* is categorised as being one of the most salt tolerant turf genera (6).

Although Cynodon is categorised as being salt tolerant, little is known regarding the relative salt tolerance differences among modern couch turf cultivars.

A study was done in Arizona with Dr. Mohammad Pessarakli to determine relative salt tolerances of 35 modern couchgrass cultivars. The study was done in a glasshouse, using highly controlled (non-varying) saline levels, achieved by growing the grasses in saline solution cultures.

This is necessary to successfully determine the relative differences among cultivars within a genera, as differences in soil moisture within field irrigation experiments, due to soil variability, soil drying, and non-uniformity of irrigation systems directly interact with salinity treatments. Using the solution culture protocol, both turf canopy and root responses to salt can be monitored.

The 35 couch cultivars were grown under five salinity levels (0, 15, 30, 45, and 60 dS/m) for several months, and both reductions in growth and visual turf quality ratings were used to rank them in salt tolerance.

Salinities resulting in 50 per cent turf canopy growth reductions ranged from 40 dS/m in FloraTex to 26 dS/m in Mirage (Table 1). It should be noted that these are salt tolerant values under ideal conditions, most notably no soil moisture stress (any soil drying will directly increase soil water salinity levels); actual field tolerance would be lower.

However, as an example it will remain true that FloraTex is nearly twice as salt tolerant as Mirage, i.e. should withstand nearly twice the soil/water salinity field levels.

In addition, a basic physiological salt tolerance mechanism was found to operate in these couch cultivars. The *Cynodon* genus is known to have microscopic leaf salt glands, which secrete salt ions (7). For example there may be 2000 or more glands per cm^2 of leaf surface.

We found that the salt tolerance of these 35 couch cultivars could be predicted, based on the amount, or rate of salt secretion activity from the salt glands.

As an example, the salt gland secretion activity of FloraTex was at least 10-times

CULTIVAR		GROWTH TYPE
FloraTex	TOLERANT	Vegetative hybrid
Cheyenne		Seeded
MS-Supreme		Vegetative hybrid - ultradwarf
Blue-muda		Seeded
Shanghai		Vegetative
Tifgreen		Vegetative hybrid
Tifdwarf		Vegetative hybrid - dwarf
TifSport		Vegetative hybrid
Riviera		Seeded
MiniVerde		Vegetative hybrid - ultradwarf
Blackjack		Seeded
TifEagle		Vegetative hybrid - ultradwarf
Champion		Vegetative hybrid - ultradwarf
Shangri La		Vegetative hybrid
Majestic		Seeded
Santa Ana		Vegetative hybrid
Floradwarf		Vegetative hybrid - ultradwarf
Midlawn		Vegetative hybrid
Guymon		Seeded
Yuma		Seeded
Yukon		Seeded
NuMex Sahara		Seeded
Princess		Seeded
Tifway		Vegetative hybrid
Panama		Seeded
Sydney		Seeded
Savannah		Seeded
Midiron		Vegetative hybrid
Sonesta		Seeded
Sultan		Seeded
Arizona Common		Seeded
Sundevil II		Seeded
Jackpot		Seeded
Pyramid		Seeded
Mirage	SENSITIVE	Seeded

Table 1. Relative salinity tolerance of 35 couch (*Cynodon spp.*) turf cultivars are listed from high to low tolerance, along with their growth types.

greater than in the most salt sensitive cultivars. This salt tolerance mechanism may become a valuable breeding tool, in which turf breeders might select improved salt tolerant cultivars based on salt gland activity.

We found a large range in salt tolerance among modern couch cultivars. This was not surprising, as the *Cynodon* genus is genetically diverse and heterozygous. Though couch turfgrasses have been traditionally considered salt tolerant, when it comes to handling salinity stress not all cultivars are created equal.

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ACKNOWLEDGEMENTS

Kenneth Marcum, Ph.D, hails from Arizona State University. He can be contacted at Kenneth.Marcum@asu.edu

ALLAN DEVLIN - SECRET HARBOUR GOLF CLUB, WA

Secret Harbour Golf Club superintendent Allan Devlin

Nickname: Devo.
Age: 49.
Family: Partner Julie …Georgia (6), Keegan (9) and Stuart (25), Sam (23) and Aimee (20).
Years as a superintendent: 25 years.
Years as an AGCSA member: 17 years.
Current club: Secret Harbour (since 1994).
Previous clubs: Burswood Park, Lake Karrinyup, Dunwood Manor (UK).

Course specs: Graham Marsh design, par 72 6423m; 1019 bentgrass greens, Wintergreen tees and fairways, tall fescue roughs.
Toro Red Jacket winner in which year: 1999 at Secret Harbour with a 79. It was sweet not only because it was on my home track, but for the fact I beat Jeff Lane by one shot!
First job in the turf industry: Working as a casual on the course at Dunwood Manor Golf Club (UK) to supplement my poor wages as a teaching golf pro.
Career highlight: Apart from winning the AGCSA Fellowship Award in 2000, the phone call from the manager of Burswood informing me I was the successful candidate – my first supers job in Australia.
Funniest moment seen on course: My son Sam vertimowing the 8th green at Secret Harbour and walking backwards to get his next line and falling in the lake. At least he had the good sense to save the machine!
Best piece of advice you have received: Never be afraid to ask questions.
One thing about your job you would change: Golfers' inability to repair pitch marks, rake bunkers and chop in divots. It creates work that shouldn't be there. I would also ban golf carts forever…they're course destroyers.
Favourite spot on your course: The 5th tee. Highest point, with great ocean views.
Most embarrassing moment as a superintendent: Can't remember ever having one because I'm so good! But there was one time I hand mowed the greens with a new employee and on my half of the 8th green I had missed six-inch strips every cut. My excuse was that we had followed the cut lines from the day before. I think he fell for it.
Overseas course you'd most like to visit: Pine Valley…but Sunningdale Old is the best course in the world.
Food you could not live without: Bread
Favourite sporting team: Leeds United… proper football!
Favourite movie: The 39 Steps, (1939 Robert Donat version).
Last CD bought: Lou Reed – Transformer.
Dream car: E Type Jaguar V12 hardtop.
Favourite golfer: Present – Aaron Baddeley. All-time – Gary Player.

AVONDALE GOLF CLUB, NSW

The Avondale Golf Club wash down bay is fitted with a boom unit to make the cleaning of machinery much easier

AT THE CAR WASH...

Regular readers of the Innovative Way section of ATM magazine will no doubt be well aware of the many innovations that Avondale Golf Club has employed around the maintenance facility.

In the last edition of ATM we highlighted the irrigation test bench which enables the crew at Avondale to diagnose and rectify any problems to the irrigation system.

This edition's Innovative Way deals with a small addition to the Avondale Golf Club wash down facility. In this day and age, the wash down bay is one of the most important areas of a golf course maintenance compound, and Avondale has come up with an innovative little addition to make things easier when it comes to washing down machinery.

A swinging boom unit, similar to what you would find at a regular car wash, has been attached which means the hose is off the ground, enabling easier manoeuvrability and eliminating the hose from becoming tangled when washing down golf course machinery. The boom unit, which is made out of parts from an old greens mower, also allows easy access to both sides while cleaning.

As well, Avondale has recycled a couple of 20-litre chemical containers which are filled with degreaser and placed on either side of the bay.

Syngenta recognises our innovative superintendents and is proud to present David Warwick and staff at Avondale Golf Club with a $150 AGCSA book voucher.

If you have, through necessity, devised or created a tool/piece of machinery gadget or made alterations to an existing piece of machinery or workplace tool to make the job easier, then we want to know about it! Call or email Brett Robinson at the AGCSA (03) 9548 8600 or brett@agcsa.com.au

Marcum touches down in Melbourne

Dr Ken Marcum from Arizona State University is currently visiting the University of Melbourne's School of Resource Management as their 2005 Visiting Scientist. During his stay Dr Marcum will be undertaking a research program with Associate Professor David Aldous on the salinity tolerance of a number creeping bentgrass and weeping grass accessions.

Thirty-nine vegetative creeping bentgrass genotypes from saline and non-saline areas have been obtained from John Neylan and Andrew Peart of AGCSATech and will be evaluated at a pre-determined salt concentration and their resultant survival rate tested. Measurements will be taken on turf quality and the degree of firing after a two-three month period.

Weeping grass has traditionally been sensitive to salt concentration, but recently a collection of seed was made from sources collected from saline areas in the Strathbogie Ranges in Victoria.

In this case the accessions will be subject to a pre-determined salt concentration. The leaf will be harvested and crushed to collect the leaf exudate tested for sodium ions. This will assist the scientists on the method of ion extraction and level of tolerance for this particular grass.

Drs David Aldous and Ken Marcum inspecting creeping bentgrass for salinity tolerance

Grasses, such as prickly couchgrass (*Sporobolus virginicus*) and Japanese lawngrass (*Zoysia japonica*) have demonstrated tolerance to salt concentrations up to 40dm-1 and are known to work through a different ion exclusion process to remove salts through salt glands. The salt concentration of sea water is 45-54 dm-1.

Dr Marcum's other interests include turf and landscape water conservation and salinity tolerance in turf and native grasses.

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Rain Bird has developed the 5004 UPG Series Rotor which can be used to upgrade PGP rotors made by Hunter

RAIN BIRD'S RECORD BREAKER

Rain Bird is claiming the longest 'throw' of any irrigation rotor with the release of its new 115-E which can propel water a distance of over 35 metres.

Combining the widest radius with excellent distribution uniformity, the 115-E is ideal for those applications such as sports fields, race tracks and parks where maximum rotor spacing is an advantage.

The distance of 35.1m is achieved with a regulated water pressure of 120psi or 8.3 bars. The rotation speed can be adjusted between one and four minutes for 360 degrees and comprises easily replaceable components and a standard rubber cover for safety on playing surfaces.

The 115-E rotor houses a heavy-duty, water-lubricated replaceable gear drive in a closed-case design with a self-flushing action which prevents internal components from sticking up. A diffuser screw allows radius reduction of up to 10 per cent without changing nozzles and arc adjustment requires no special tools for easy modifications.

Available in part circle and full circle models with auto-reverse and non-reversing options, the new 115-E operates at flow rates of between 153 and 276 litres per minute with a nozzle trajectory of 25 degrees and a maximum stream height of 7.3m. It comes with an optional artificial grass cover which can be supplied plain for custom fitting of artificial turf.

Rain Bird has also developed the 5004 UPG Series Rotor. UPG stands for 'upgrade' because they can be used to upgrade PGP rotors made by Hunter Industries Inc. without the need to dig out the entire casing.

All turf managers have to do is expose the top of the rotor which is unscrewed to access the internal assembly. Simply lift this out and replace it with the Rain Bird 5004 UPG and screw it into place. After installation, remove the orange O-ring from the top of the rotor and replace the turf. The flow shut-off feature means the nozzle can be changed without shutting down the entire zone at the valve.

With four models to choose from, there is a Rain Bird 5004 UPG to replace every Hunter PGP rotor.

The Rain Bird 115-E rotor and 5004 UPG Series rotors are available from authorised Rain Bird distributors or for more information, contact Rain Bird Australia on 1800 424 044 or Rain One Australia on 1300 132 302, or visit the Rain Bird website at www.rainbird.com.

SUPERS GET REVVED UP

Four superintendents are set for the ride of their life following Rain Bird's announcement of the winners of its V8 Supercar competition. Glenn Cross (Mt Lawley Golf, WA), Mark Schroder (Waverley Golf Club, VIC), Patrick Henry (Shortland Waters Golf Club, NSW) and Robin Doodson (The Links Port Douglas, QLD) will be kitting up for a hot lap after winning the competition which was held during the 21st Australian Turfgrass Conference.

stamina 90
THE LONG TERM NON-BURN SURFACTANT

A REVOLUTION IN SURFACTANTS

US soil surfactant business Aquatrols has partnered with Nuturf to release Revolution, the latest in wetting agent technology.

Released at the 21st Australian Turfgrass Conference in Echuca-Moama, Revolution works at a different level to the average wetting agent by increasing the stress tolerance of the turf plant.

Available from this spring, Revolution works in the soil to allow the plant to function at its greatest potential, optimising oxygen in the soil profile by holding water more tightly to the soil particle.

As a result of using Revolution, turf quality and uniformity is improved, chlorophyll and proline levels are increased, contributing to consistent colour and improved playability. This is the result of the increased photochemical efficiency of the turf plant and an extension of the plant's natural anti-oxidant levels.

Following extensive Australian testing Nuturf has also developed another product for the Australian turf market with Stamina 90 is available this season exclusively from Nuturf.

Stamina 90 is the leading product in the Stamina range and has the ability and consistency to overcome hydrophobicity for months. Extensive trials have shown that Stamina 90 works particularly well at the 3-4 month period and is the longest residual non-burn product in the turf market.

Stamina 90 will be useful in a variety of turf situations. The non-burn attribute has been significantly tested and is useful when watering in straight away is difficult.

Stamina 90 also has excellent tank mix flexibility, and with one application at the start of the season, it has the ability to overcome hydrophobicity for prolonged periods.

By overcoming hydrophobic conditions, water and soil applied chemicals are evenly distributed through the soil profile, resulting in water savings.

For more information about Revolution or Stamina 90, go to www.nuturf.com.au for a product analysis, or call 1800 631 008 and speak to wetting agents business manager Alex McCorquodale or your local Nuturf territory manager.

AQUATROLS®
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HERITAGE MAXX HITS MARKET

Syngenta has recently launched a new liquid formulation of Heritage fungicide. Designed exclusively for turf, the Heritage MAXX micro-emulsion formulation provides quicker foliar intake and root uptake, resulting in faster protection against disease.

Australian trial results demonstrate that Heritage MAXX has the broadest spectrum of activity of fungicides on the turf market. It controls three of the top four significant turf diseases - pythium, brown patch and anthracnose - and it can also be tank mixed with Banner MAXX or Daconil Weatherstik to control dollar spot.

Heritage MAXX has the longest application interval of any turf fungicide. It provides excellent residual activity that allows for application intervals of up to 28 days.

Heritage is the only systemic strobilurin on the Australian turf market. It enters the turfgrass plant through the leaf blade, stem, crown or root system. Heritage MAXX improves on that performance with studies showing a potential increase in efficacy of up to 15 per cent against selected diseases like anthracnose.

BLACK BEETLE BE GONE

Two of the most damaging turf insect pests, African black beetle and billbug, can now be controlled with Syngenta's Meridian insecticide.

Meridian provides highly efficacious and thorough control of pests for up to 100 days. At very low use rates it acts through contact and ingestion activity on all stages of insect development, except the egg stage.

Thiamethoxam, the active ingredient in Meridian, is a broad-spectrum insecticide controlling sucking and chewing pests and belongs to a new generation of chemistry known as the neonicotinoids. Thiamethoxam has translaminar and systemic activity in the plant and is absorbed through the leaf, crown and root.

Thiamethoxam is taken up rapidly into plants, with up to half of the compound absorbed within 24 hours of application. Insect pests that come in contact with or ingest thiamethoxam demonstrate altered behaviour within an hour and stop feeding soon after. Death generally occurs within one to two days after application.

Meridian is an odourless water dispensible granular formulation and due to its high water solubility, it moves efficiently to the target root zone of turf. As it requires only a low level of rainfall or irrigation to effectively penetrate dry soil profiles, Meridian is ideal for Australia's dry conditions.

For further information please call the Syngenta Product Advice Line on 1800 067 108 or visit greencast.com.au.

Syngenta's Meridian insecticide is an effective tool in the control of African black beetle

MEMBER BENEFIT FOCUS
COURSE QUALITY OFFICIALS PROGRAM

Every year as part of the Australian Open, the AGCSA is privileged to assist with the maintenance of the course through the Course Quality Officials (CQO) program.

The program has been in operation for a number of years now and gives AGCSA members the perfect opportunity to walk inside the ropes with the players during the prestigious tournament.

Armed with a bunker rake, and in some cases a bucket of sand, the CQOs repair any divots after a player has made his shot, as well as tidying bunkers for those groups behind.

Being inside the ropes means CQOs can get a full appreciation of the high level of presentation required for a major tournament as well as feel the satisfaction of helping out their peers at the host course as they strive to present a world class test of golf.

In particular, the CQO program is an excellent learning experience for young staff members and the AGCSA encourages superintendents to get their apprentices and junior members of staff involved.

This year's Australian Open returns to Moonah Links on Victoria's Mornington Peninsula where superintendent Leigh Yanner and his crew will host the Open for the second time in three years.

All CQOs receive a free shirt for their efforts and for the real lucky ones they may come away with a signed shirt, golf ball, or in the case of Yarra Valley Country Club superintendent Dean Johnson, a signed bible from devout professional Euan Walters!

The 2005 Open will be held from 24-27 November. Stay tuned to the AGCSA website for more details on registering to be part of this great opportunity.

A diligent CQO at work

THE AGCSA: WORKING FOR YOU

The AGCSA is committed to providing greater resources to enhance its leadership, unification and professional development of the Australian turfgrass industry and its members.

Membership of the AGCSA enables golf course superintendents as a collective unit to have their say on matters such as education, turf research, legislation and industry development.

During 2004, the AGCSA undertook a major redesign of its website for the use of all members of the turf industry. The AGCSA believes that this medium is becoming a vital communication tool for the industry and something which members need to become familiar with.

The new-look website features a special 'Members Only' section, where special offers available only to AGCSA members will appear. Members will also be able to update their contact details in this area.

In July 2004, the AGCSA and Toro Australia signed a unique agreement to help foster the next generation of superintendents and turf managers.

Toro has put its name to the Next Generation membership program which will provide numerous incentives for student members of the AGCSA.

As it stands, the price of an AGCSA student membership is $77 per annum. However, under the Next Generation membership scheme, existing and new student members of the association will only pay half that amount ($38.50), with Toro footing the balance.

The program is expected to develop a national turf management career day, access to overseas exchange programs, tournaments and regular educational tours.

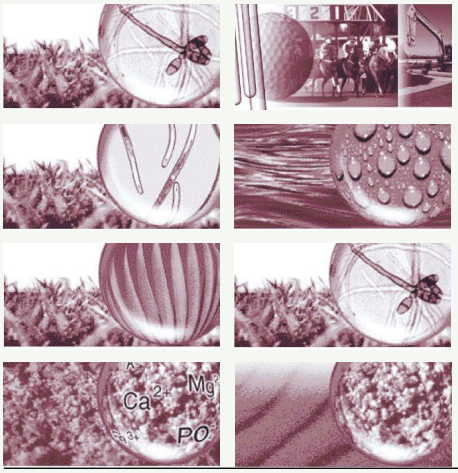
Other membership benefits include:

- Six editions of the bi-monthly AGCSA journal Australian Turfgrass Management magazine, the No.1 turf industry publication;
- AGCSA year planner and turf diary (new in 2005);
- AGCSA members gift;
- Access to the AGCSA 'Members Only' and Online Auction sections of the AGCSA website;
- Regular AGCSA newsletter and The Cut email newsletter;
- Access to the AGCSA Trade Directory;

- Discounted AGCSA merchandise; conference registration and roving workshops;
- Member discounts on soil and water testing, disease diagnosis and other analytical services through AGCSATech;
- Discounted books from the extensive AGCSA bookshop;
- Free legal service provided by Madgwicks Solicitors providing up to half an hour free legal advice on any subject;
- Regular mail-outs of positions vacant within the industry. Job Watch email alert service;
- Access to AGCSA Contracts of Employment;
- Regular opportunities to meet with your peers and the allied turf trades;
- Access to AGCSA Skills Recognition Program, Accreditation Program and AGCSA endorsed qualifications;
- Opportunity to be involved in the Australian Open Course Quality Officials program; and
- Clearmake Industries offers AGCSA members a 10 per cent discount on all products and services company-wide. Products available include oil water separators, water recycling plants, gross pollutant traps, rope mop oil skimmers and diversion and spill control valves.

If you have any questions or queries about becoming an AGCSA member or about any of the above listed membership benefits, please do not hesitate to contact Paula Dolan, membership services and administration co-ordinator, on (03) 9548 8600 or email info@agcsa.com.au.

You too can discover how the AGCSA can assist and make a difference in your future endeavours within the turf industry.



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Membership Application Form

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TURF INDUSTRY BOOKSHOP

GENERAL	Non-Member	Member
A Field Guide to Australian Frogs	$56.90	$48.37
Arborculture – 4th Edition	$202.05	$171.74
Modern Arboriculture	$228.45	$194.18
2005 Turfgrass Management Diary	$86.25	$73.31

GOLF	Non-Member	Member
Practical Guide to Ecological Management on the GCourse	$87.04	$73.98
Best Golf Course Management Practices	$316.25	$268.81
Bird Conservation on Golf Courses	$94.88	$80.65
Discovering Donald Ross-The Artchitect & his golf courses	$300.49	$255.42
Ecological Golf Course Management	$197.68	$168.03
Golf Architecture	$115.00	$97.75
Golf Architecture in America	$276.79	$235.27
Golf Course Architecture -Design, Construction & Restoration	$245.17	$208.39
Golf Course Construction, Renovation and Gro-In	$196.38	$166.92
Golf Course Design	$221.38	$188.17
Golf Course Irrigation: Environmental Design & Mgmt Practices	$221.38	$188.17
Golf Course Management & Construction	$445.63	$378.79
Golf Course Tree Management	$150.99	$128.34
Golf Facility Planning	$222.86	$189.43
Golf Has Never Failed Me	$107.86	$91.68
Human Resource Management for Golf Course Superintendents	$126.50	$107.53
IPM Handbook for Golf Courses	$197.68	$168.03
Keepers of the Green: A history of GC Management	$150.29	$127.75
Managing Wildlife Habitats on Golf Courses	$150.29	$127.75
Masters of the Links	$87.04	$73.98
Practical Golf Course Maintenance –Magic of Greenkeeping	$173.99	$147.89
Rough Meditations (HB)	$87.04	$73.98
Superintendents Handbook of Financial Management	$126.50	$107.53
The Care of the Golf Course – 2nd Edition	$166.06	$141.15
The Golden Age of Golf Design	$221.38	$188.17
The Golf Course -Planning, Design, Const and Management-HB only	$366.61	$311.62
The Good Doctor Returns Alistair Mac comes back to golf	$71.18	$60.50
The Life & Work of Dr Alistair Mackenzie	$215.63	$183.29
The Links	$189.75	$161.29
The Sand Putting Green - Construction & Management (leaflet)	$28.51	$24.23
The Sandbelt	$143.75	$122.19
The Spirit of St Andrews	$102.81	$87.39
Turf Management for Golf Courses	$363.74	$309.18
Wastewater Re-use for Golf Course Irrigation	$316.25	$268.81

SOIL & COMPOSTING	Non-Member	Member
Growing Media for Ornamental Plants and Turf	$94.88	$80.65

TURF & WEEDS	Non-Member	Member
Australian Weed Control Handbook - 10th Edition	$110.74	$94.13
Biological Control of Weeds	$142.36	$121.01
Bowling Greens:The History Construction & Maintenance	$145.24	$123.45
Color Atlas of Turfgrass Diseases	$261.63	$222.39
Color Atlas of Turfgrass Weeds	$309.11	$262.74
Compendium of Turfgrass Diseases	$205.61	$174.77
Controlling Turfgrass Pests 2nd Edition	$337.86	$287.18
Creeping Bentgrass Management - Summer stresses	$184.00	$156.40
Cricket Grounds	$208.49	$177.22
Cricket Wickets – Science vs Fiction	$115.00	$97.75
CSIRO Handbook of Australian Weeds	$79.11	$67.24
Destructive Turfgrass Insect - Biology, Diagnosis & Control	$258.75	$219.94
Diseases of Turfgrass	$345.00	$293.25
Diseases of Turfgrass CD-Rom	$316.25	$268.81
Drainage for Sportsturf and Horticulture (PB)	$65.53	$55.70
Fertilisers for Turf	$79.11	$67.24
Field Guide to Weeds in Australia	$136.61	$116.12
Fundamentals of Turfgrass Management	$181.12	$153.95
Fundamentals of Weed Science 2nd Edition	$237.24	$201.65
Golf Course Turf Management	$316.25	$268.81
Grasses of New South Wales	$51.75	$43.99
Grasses of Temperate Australia – A field guide	$86.24	$73.30
Handbook of IPM for Turf & Ornamentals	$337.86	$287.18
International Turf Management Handbook	$337.86	$287.18
Management of Turfgrass Diseases	$426.99	$362.94
Managing Bermudagrass Turf	$229.31	$194.91
Managing Turfgrass Pests	$323.49	$274.97
Manual of Grasses	$142.36	$121.01
Native Grasses: Handbook for Temperate Australia 3rd Ed	$35.88	$30.50
Natural Turf for Sport & Amenity	$173.99	$147.89
Noxious Weeds of Australia –Revised Edition	$280.36	$238.31
Nursery & Landscape Weed Control Manual	$142.36	$121.01
Organic Control of Weeds	$21.61	$18.37
Picture Perfect, Mowing Tech for lawn, sports & Turf	$118.67	$100.87
Salt-Affected Turfgrass Sites - Assessment & Management	$221.38	$192.50
Sands for Sports Turf Construction & Maintenance	$79.11	$67.24
Seashore Paspalum – The Environmental Turfgrass	$213.54	$181.51
Sports Fields –Manual design, Construction & Maintenance	$253.00	$215.05
Sportsturf Protection Manual - The Complete Guide Guide to all Turf Protection Products	$253.00	$215.05
Sports Turf & Amenity Grasses -A manual for use & Identification	$122.24	$103.90
Sports Turf - Science, Construction & Maintenance	$316.25	$268.81
The Turfgrass Disease Handbook	$173.99	$147.89
Tree, Turf, Ornamental Pesticide Guide	$115.00	$97.75
Turf Irrigation Manual	$179.74	$152.78
Turf Weeds and Their Control (HB)	$313.38	$266.37
Turfgrass Diseases & Associated Disorders	$115.00	$97.75
Turfgrass Maintenance Reduction Handbook	$309.11	$262.74
Turfgrass Management-7th Edition	$284.63	$241.94
Turfgrass Management Information Directory	$126.50	$107.53
Turfgrass Patch Diseases	$194.11	$164.99
Turfgrass Pests	$94.88	$80.65
Turgrass Problems: Picture Clues & Management Options	$115.00	$97.75
Turfgrass Science & Culture	$284.63	$241.94
Turfgrass Science & Management 3rd Edition	$156.62	$133.13
Turfgrass Soil Fertility & Chemical Problems	$287.50	$244.38
Weeds an Illustrated Guide to Weeds of Australia	$197.68	$168.03

WATER, IRRIGATION	Non-Member	Member
Drainage for Sportsturf & Irrigation	$58.53	$49.75
Effluent Water for Turfgrass Irrigation (leaflet)	$7.24	$6.15
Evaluating Turfgrass Sprinkler Irrigation Systems (leaflet)	$11.50	$9.78
Nitrates in Groundwater	$251.61	$213.87
Simplified Irrigation Design 2nd Edition	$196.29	$166.85
Turfgrass Irrigation scheduling (leaflet)	$8.63	$7.34
Water in Australia: Resources & Management	$107.86	$91.68

The AGCSA has an extensive range of books that can ordered through the AGCSA website, and also through the accompanying order form on page 59.

Best sellers for 2004/2005:

Turfgrass Management 7th Edition by A J Turgeon

Compendium of Turfgrass Diseases by Doernoeden Smiley

Seashore Paspalum: The Environmental Turfgrass by R R Duncan

Turfgrass Science Management - 3rd Edition by R Emmons

Colour Atlas of Turfgrass Diseases by T Tani & J Beard

The Sandbelt by Paul Daley

Golf Course Architecture - Design, Construction & Restoration by Michael Hurzdan

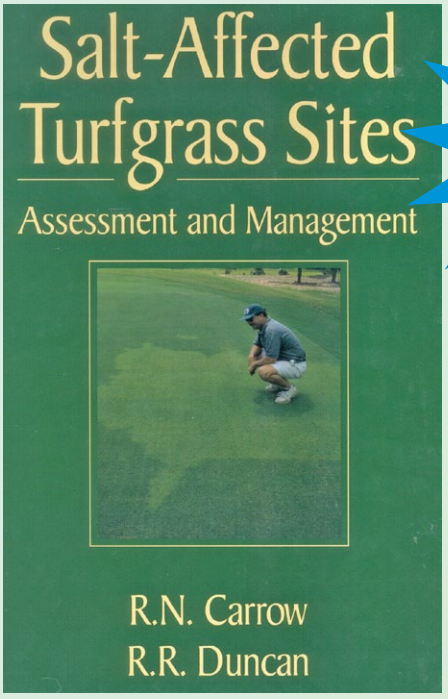
'The Sportsturf Protection Manual' – The Complete Guide to all Turf Protection Products by John Neylan – AGCSATech - 2005 Update Included

Please note: All prices include GST and are subject to change without notice.
Postage: $9.90 for first book and $1.10 for every book after.

Salt-affected Turfgrass Sites: Assessment and Management

R.N Carrow and R.R Duncan

Ann Arbor Press



AGCSA MEMBER PRICE: $192.50

NON-MEMBER PRICE: $221.38

Salt-affected turfgrass sites are becoming more common due to many reasons: use of wastewater or other irrigation sources containing salts, the location of golf courses on coastal sites that are susceptible to salt water intrusion, flooding and salt spray or in other environmentally sensitive areas; use of sands that are easily salinised for growing media; and water conservation pressures.

Regardless of the cause, salt-affected sites present one of the most difficult and complex management challenges that a turfgrass manager may confront.

Complied by Dr Robert Carrow and Prof Ron Duncan, both of whom were keynote speakers at last year's 20th Australian Turfgrass Conference in Melbourne, Salt-affected Turfgrass Sites: Assessment and Management brings together the information required to assess salt-affected problems that can lead to development of best management practices.

It also aims to present in greater detail and scope comprehensive information on the soil-water-plant-climatic components of this issue, and hopes to encourage turfgrass growers, consultants and research scientists to understand salt-affected problems and focus on developing even better management strategies in the future.

The book is split into three sections – the basics of salt-affected soils, soil and water quality testing for salt-affected sites and the management of salt-affected sites. There is also a fourth section which looks at some interesting case studies.

The first section looks at the scope and causes of salt-affected soils, salt-related problems as well as classifications and characteristics. The second part on testing covers soil tests and irrigation water quality analysis and their interpretation.

The management section looks at site assessments, the selection of turfgrass and landscape plants, leaching of salts and water management, and the selection of amendments and application guidelines and methods. As well, there is a chapter on additional cultural practices which deals with nutritional and physiological problems, environmental and traffic stress, wastewater and monitoring progress.

ORDER FORM - ORDERS CAN ALSO BE MADE SECURELY ONLINE THROUGH www.agcsa.com.au

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GCSAWA

Hopefully all you fellow grass growers are experiencing some relief through precipitation. In WA the early winter rains have been extremely good with constant heavy falls recorded through all parts.

We have been beating our monthly average rainfall by in excess of 60mm with the wettest start to June in 41 years. Total rainfall from January to June is already 521mm and our dam storage to date is at around 27.2 per cent which equates to 11.5 gigalitres more than this time last year. Up against last year's total annual rainfall of 637 mm we are definitely off to a good start.

On the local scene, members have been a little thin on the ground at recent golf events, with only seven out of 21 registrations at Lake Karrinyup for round four of the Golf Masters Cup actually golf employees. The day was enjoyed by all and thanks kindly to the members and staff of Karrinyup, Trevor Strachan and Jarrod for their kind hospitality. A bonus for me was my nearest the pin on the 1st short course. Must be pretty bad when a crab like me on a 36 gets NTP!

By now all members should have received their GCSAWA membership renewals through the post courtesy of the AGCSA. It has been decided this year, in close consultation with the AGCSA, to place our membership database back in to their hands.

Paula Dolan has been employed specifically to manage state and national membership databases and has done an excellent job in cleaning up and redeveloping the old system which had contributed to some problems encountered previously. I am certain that along with your help in updating your local executive committee or directly through Paula (info@agcsa.com.au) we will avoid any hassles experienced previously. To set off on the right foot, each member will also be contacted by an executive committee person soon to double check your details.

For the first time in many years the executive committee has raised the annual subscriptions to $100 plus GST for all members, excluding students who remain at $20 plus GST. This necessary increase will provide for the rising administration and quarterly printing costs for DIVOTS which I am sure you will all agree remains at an excellent standard.

Coming up in August is the GCSAWA AGM and by now you all should have received the notices and election to office forms. If you are a keen A Class member and would like to be actively involved in running the association, please consider this opportunity.

At the AGM, we hope to announce the Best Indentured Apprentice Award for 2004. All of our candidates will have been interviewed, so it would be great to get an excellent roll up to support the winner and demonstrate the close camaraderie our state is renowned for.

I have recently had several phone calls requesting info on the disposal of unregistered or old chemicals from turf facilities. I have used a company called Western Resource Recovery to dispose of my old products a number of times, and, provided with enough information about each chemical, they are happy to service the golf industry. For more details call me or read my GCSAWA report in DIVOTS.

To expand on my last report regarding the skills shortage and wages/conditions issue within the WA turf industry, the GCSAWA executive committee is developing a Turf Industry Awards and Conditions Survey which we hope to be sent to GCSAWA members for their attention. We hope that the General Managers' Association will also endorse this survey, and encourage superintendents to take the time to fill out the survey and provide some detailed feedback about current workplace conditions.

I must stress that this information is for the use of the GCSAWA to get a broader view of current wages and workplace conditions within WA, and will not be used inappropriately.

BRAD SOFIELD,
PRESIDENT, GCSAWA.

GCSAWA

SAGCSA

Rain at last! Good drenching rains in June have finally put some water in the dams here in South Australia, with year to date totals in some places doubling in the last two weeks of June. Good follow up rains are still needed before summer, however.

The SAGCSA AGM was held in late May at Kooyonga Golf Club (superintendent Steven Newell). After the morning course walk over the immaculately presented layout, it was back to the clubhouse where Royal Sydney Golf Club super John Odell was guest speaker.

John kept the gathering entertained with an highly enlightening account of managing up and down the line Royal Sydney style. Also making a presentation was South Australian Graduate of the Year Brenton Wenham from Willunga Golf Club.

The SAGCSA committee for the year now compromises:

President: Peter Harfield
Vice-president: Darryl Sellar
Secretary: Steven Newell
Committee: Brian Cooper, Mal Grundy, Jeff Kaines and Ivan Swinstead.

TURFGRASS CONFERENCE

The 21st Australian Turfgrass Conference in June, apart from being another well-organised and informative event, was also a chance to catch up with familiar faces.

On that note it was great to catch up with two well-travelled South Australians and stalwarts of AGCSA conferences, Wayne and Pam Dale. Congratulations are in order as they have just become proud grandparents for the first time; the jury is still out on whether there is another surfer or golfer in the family.

On the golfing front at Moama, Team South Australia relinquished the coveted state title to NSW. Not even some creative interpretation by Tewantin Noosa superintendent and AGCSA Board member Jon Penberthy, who was an honorary South Aussie for the day, could get us over the line.

COUNTRY MEETING

The next SAGCSA gathering will be our country meeting at the Naracoorte Golf Club on Monday, 10 August (host superintendent Paul Clark). Please note that Monday will be used for this visit. This is a different format from previous country visits, but as the distance from Adelaide makes it difficult to make a day trip of it, this format may allow members to take advantage of travelling down over the weekend. See you there.

PETER HARFIELD,
PRESIDENT, SAGCSA.

SAGCSA

NSWGCSA

I would like to formally congratulate the AGCSA board and staff for the excellent job organising and running the 21st Australian Turfgrass Conference in Echuca-Moama. A great week was had by all with even the doubting Thomas's singing their praise. It was great to get to a different venue and one where the majority of delegates were in one location whether for the education component or the nightly social events.

It was also a successful week for NSW with Peter Brown winning the Distinguished Service Award, Darren Jones winning the Excellence in Golf Course Management Award and Damien Bell collecting the Graduate of the Year. These three gentlemen were worthy winners and great ambassadors for NSW. I think NSW even won the paintball despite the kamikaze efforts from the AGCSA's Scott Petersen.

Winter weather is finally upon us after what was a very mild and pleasant April-June period. Finally NSW has received some widespread rainfall with falls ranging from 50mm to 200mm across many of the drought-stricken areas. Our thoughts go out to all those caught in the floods and deluge in the northern part of the state and Gold Coast area. Tier 3 restrictions have come into effect in the Sydney area with no further tightening on our industry which has already reduced use dramatically.

Various companies providing technology for alternative water sources or improved efficiency have approached the industry with information days and trials. A day was recently held at the Royal Motor Yacht Club at Newport. Presentations from Anthony Dickson (Waterfresh), Peter Cooper (NuSource), and Pall membrane systems were provided. NuSource and Pall systems use microfiltration, membrane and reverse osmosis technology to treat wastewater. Waterfresh use sonic disintegration, ion exchange as well as membrane technology to treat water.

Information provided on the regulatory limitations of extracting, treating and using the water was interesting. Pennant Hills Golf Club has submitted a DA and EIS to install a sewer mining plant and storage. Bexley Park Golf Club is also in the process of setting up a sewer mining plant. We watch with interest.

Another company that has developed a product to provide sub-surface irrigation has approached the industry. The system, which emits water through dripper lines that are enveloped by a type of geo-fabric, is providing dramatic water use reductions for users. The company is keen to set up trials on golf course tees or fairways to assess its application for sports turf.

KIRKBY TO STEP DOWN

Board member for eight years Richard Kirkby is stepping down at this year's AGM. Richard has worked on education over that time and ran the Apprentice/Trainee of the Year awards. Richard also has more recently injected his style into the apparel range. The board and members thank Richard for his many hours of work and professionalism on the board.

New members on the board are Craig Wright (Cammeray Golf Club) and Mal Durkin (Moore Park Golf Club). Portfolios are Guy Thomas and Scott Riley (field days), Justin Sheehan and Craig Molloy (newsletter), Darren Jones and Wayne Hawley (treasury), Andy Hugill (education), Craig Wright (membership and apparel) with Mal Durkin taking over as secretary.

The board is looking at developing a practical safety document checklist for its members. Typical risk assessments, hazard and incident register, meeting records, training matrixes etc will be provided for clubs to use and modify to their specific needs.

This will hopefully simplify some of the OH&S requirements and assist the many clubs that have not yet been able to complete this time-consuming task. Financial support has been sought from the NSWGA.

FIELD DAYS

The annual Cypress Lakes day on 25 July was booked out a month in advance with Merve Hayward's course and those Hunter reds proving a popular combination for the Ambrose event.

The NSWGCSA AGM is scheduled for 29 August at Bexley Golf Club. Guy Thomas, Andy Hugill and Terry Muir will provide updates on their environmental audits, EMPs and the progress made at their clubs. Former Australian international cricketer and commentator Kerry O'Keefe will be speaking on his experiences and the Ashes tour.

DEC TRIALS

The DEC is setting up an organic product trial with several Sydney and Illawarra golf clubs. The trial is setting out to determine industry requirements for the production of recycled green waste. Various products will be assessed and trialed to develop a specification for the recycling industry which is suitable for golf course use.

ASHES TO ASHES

After 27 years service at The Australian Golf Club, Rob Ashes has left the club. Rob is currently enjoying some long-earned leave. Another long serving superintendent Greg Flint was made redundant after 27 years at Cromer Golf Club. Greg has received enormous support from his peers and friends in the industry. It is bitterly disappointing to see anyone that has given so much to their employer over so many years treated in such a manner. We wish these long serving stalwarts all the best.

At the time of writing I have also heard that Liverpool Golf Club has decided to contract out their course maintenance. A disappointing result for this association.

All the best for the rest of winter.

MICHAEL BRADBERY,
PRESIDENT, NSWGCSA.

NSWGCSA ▶

VGCSA

The VGCSA has a new-look committee following the recent AGM at the Peninsula Country Golf Club. There have been a number of changes and the new young and dedicated committee is made up of:

President: Mark Prosser (Commonwealth Golf Club)

Vice-president: Michael Freeman (Huntingdale Golf Club)

Secretary: Peter Jans (Sanctuary Lakes Golf Club)

Treasurer: Glen Davie (Freeway Golf Club)

Committee: Adam Robertson (Kew Golf Club), Trevor U'ren (Devil Bend Golf Club), Darren Green (Lang Lang Golf Club) and Brett Chivers (Keysborough Golf Club).

Peninsula superintendent Steve Hughes and his staff had the course in great condition and showed us the huge amount of work that has been completed over a number of years. A big thanks to Steve for a great day and his support of the VGCSA

With a score of 73, Scott Balloch from Eagle Ridge Golf Club won the Powell Trophy and with 40 points also won the Toro Cup. Paul Robinson from Kyneton Golf Club was runner-up with 37 points. Allen Middleton from Country Club International won the Presidents Cup for the trade.

Congratulations to all winners and thanks to Toro and Alan Phillips for their assistance in running a successful golf tournament. Everyone is now wondering if anyone else other than a member of the Balloch family can play golf in Victoria! It was also nice to hear both Brett and Scott appreciate each other's hairstyles.

Horsham Golf Club will be the venue of the VGCSA's country meet in August

SPONSORSHIP PACKAGES

All trade members have recently been notified in regards to new sponsorship packages available for 2006. We believe we have catered for all trade members in the flexibility of packages available.

Those that have proudly sponsored the VGCSA in the past will be given preference, but new packages will allow more trade to come on board in some way that will be beneficial for all. If you have not received information on these packages please let us know promptly.

COMING UP

First, congratulations to the AGCSA for initiating the very successful Chemical Spill Exercise workshops. These days were well publicised and widely spread across Victoria. Attendance by the turf industry as a whole was exceptional but golf course superintendents' attendance could have been greater on such an important topic.

To back up Allan Devlin, recently voted to the AGCSA Board, I support his thoughts in the July edition of the AGCSA Action newsletter. We do need members to support events and encourage more superintendents, assistants and other staff to join.

As stated in the last VGCSA report, an aim of the new committee is to increase our membership numbers and attendance at all meetings. If you have suggestions or want your club to participate in a general meeting, please contact us.

The next VGCSA meeting will be at Horsham Golf Club on 7-8 August. Please come and dine at the Horsham Golf Club on Sunday evening and bring the family if you wish. On Monday we will have breakfast at the golf club followed by our general meeting, course inspection, BBQ lunch and golf. Come and look at this magnificent course and meet new superintendent Tim Warren who is doing a fantastic job. The next meeting after that will be at Wayne Dale's Growling Frog course on 3 October.

Finally, our thoughts are with superintendents up north where rainfall has been massive. We wish you all the best on the road to recovery.

MARK PROSSER,
PRESIDENT, VGCSA.

TGAA VIC

For many of us the winter months are a time to slow down, take a break and plan for the spring. However, at the TGAA this is our busiest time of the year.

Since the last magazine much has happened. We bid au revoir to Rob Savedra (Wesley College), Bill Sclarretta (Scotch College) and Warwick Starr (Bankstown Council) as they travelled to the UK for our first Australian and British Ground Managers Exchange. I am sure we all look forward to hearing their adventures upon their return.

Our annual turf wicket seminar again attracted in excess of 200 delegates to the Telstra Dome. The 'back to basics' approach adopted this year gave curators new and old alike the chance to share knowledge and techniques. The speakers for the day certainly gave no-nonsense, concise information that was easily digested and, we hope, acted upon.

The TGAA (Vic) continues to be an active member of VICSWU. Water will continue to play a crucial and at times controversial role in our future, and we believe it is critical for the association to be in a position to support our members and their jobs. We will keep you updated as information becomes available and we ask that you don't hesitate to contact us with any thoughts or concerns pertaining to water use, guidelines and restrictions.

Finally we are preparing for our Celebrity Sports Luncheon on Wednesday, 24 August. For Victorian subscribers of this magazine a flier for the day is enclosed. Our guest speakers this year are Darren Berry, Glenn Archer, Tamsyn Lewis and comedian Andrew Startin. Download a form from our website www.tgaa.asn.au or contact (03) 9548 9327.

ANTHONY UHR-HENRY,
PRESIDENT TGAA (VIC).

GOLF SIGNAGE

- Recycled Plastic - Timber - Bronze - Aluminium

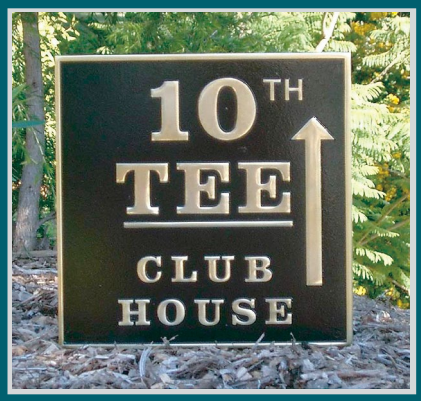
Recycled Plastic Tee Information Sign with Sponsor Board

Recycled Plastic Road Sign

Recycled Plastic Car Park Sign

Hardwood Course Sign

Recycled Plastic Road Sign



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NZGCSA

Greetings once again from across the Ditch. We have had a fair bit going on recently with the New Zealand Sports Turf Conference at Riccarton Racecourse in Christchurch and our AGM.

The NZGCSA Golf Championships were held prior to the conference at Clearwater. Conditions under foot were good but competitors had to deal with icy winds and a hailstorm thrown in to the mix after about six holes. Some of the scores returned were very good, while others…. well let's say we all enjoyed the day.

Winner of the gross was Iain Power (Whangarei Golf Club) in the north of the North Island, while the nett trophy went to one of the NZGCSA executive, Peter Boyd from Pakuranga Country Club in Auckland. Winner of the stableford was Steve White from the Carrington Resort, which is even further north just out of Kaitaia, some 120km from the northern tip of NZ. Yours truly was lucky enough to sneak in with a spot stableford prize.

The conference started in earnest on Tuesday with speakers covering a range of topics from environmental issues to *Poa* management over four days.

One of the keynote speakers was Greg Turner who spent many years on the European Tour. He has recently retired from competitive golf and has set up Greg Turner Golf, which has many interests including golf course design. Greg gave two very informative lectures, which held delegates' attention right to the end.

The Thursday field trip went back to Clearwater before we hit the road to Methven Golf Club situated at the foot of the Southern Alps. From there we travelled to take in the breathtaking scenery of Terrace Downs. Terrace Downs is nestled in the Rakaia Gorge with the Alps providing an incredible backdrop. (***See AGCSATech Update, pages 28-30***)

The AGM was held at Terrace Downs with new member Ian Douglas from The Hills – a new development in Queenstown – elected to the executive. The full executive is as follows:

President: Brett Burgess (Hutt Golf Club)

Committee: Peter Boyd (Pakuranga Country Club), John Spraggs (Royal Wellington), Ian Carruthers (Corringa Country Club), Ian Douglas (The Hills), and Layne Young (North Shore Golf Club).

Healthy debate took place at the conference on the future of the sports turf conference in New Zealand. The outcome could well see a move back to the NZGCSA running our own conference again.

Well the Lions tour has come and gone (nice clean sweep by the ABs) and we now focus our energies on the Tri Nations. It should be a great series; I just hope the All Blacks haven't peaked too soon and once again take the prize for the best rugby team in the world between World Cups. Time will tell.

And finally, with the recent terrorist attacks in London our thoughts are with those who had loved ones caught up in these shocking incidents. These sorts of things make you realise just how precious life is.

BRETT BURGESS,
PRESIDENT, NZGCSA.

GCSAQ

As I write this report, a lot of clubs in Queensland and northern New South Wales are in clean up mode after the copious amounts of rain we have been receiving. It wasn't that long ago that we were all screaming out for it, but not in this amount. For a full run down of all the events in Queensland, see this edition's cover story, from page 8.

On the field day front, the John Deere Challenge was held at Nudgee Golf Club which was presented in perfect condition by David Brushfield and his team. After a four way countback, McLeod Golf Club came through for a win ahead of Redcliffe Golf Club and Nudgee. Well done to all teams and best of luck to McLeod and Redcliffe in the Australian final. Thank you to Bill and his team at BHM Machinery for a wonderful day.

In May we also ran an Environmental Safety Seminar day which was very well attended. Thirty-seven clubs were represented with 50 attendees in total and others on the waiting list to get in (wouldn't that be great to see at all our field days!). Feedback has been very positive with all who attended, including general managers and club committee members, talking about it. The day saw us doing risk assessments and looking at operating procedures.

June saw the 21st Australian Turfgrass Conference and a healthy contingent of Queenslanders making the trip to Echuca-Moama. A big congratulations to the AGCSA on running a very successful conference and thank you to those who found their way back to my accommodation in Moama each night to have a cook up in the room - this really affected my sleeping pattern. Also, if anyone has information on the culprit who filled my bed with washing powder, could they please contact me.

The conference proved to be a successful one for Queensland, with Ben Marshall (Club Pelican) and Scott McKay (North Lakes Golf Club) sharing the prestigious Claude Crockford Environmental Management Award. The GCSAQ congratulates you both.

The Northern Rivers Golf Staff Day at MacLean Golf Club attracted 55 which was great considering what clubs in this area are going through with the recent wet weather. Congratulations to Pat Day and his staff on the condition of the course and to Bonville Golf Club on again taking out the championship.

MOVING ON

Around the traps, good luck to Darryl Edwards from Sanctuary Cove with his new position in Fiji. It was great having you back in the country and hopefully we will see you back in this part of the world soon.

To Tim Bilston, a warm welcome from Huntingdale Golf Club as new superintendent at Carbrook Golf Club - I hope you weren't the one that has brought all this weather with you!

Elsewhere, Craig McGrath has moved from the 2IC position at Lakelands Golf Club to a position in Fiji as well, and Phil Soegaard has taken over his vacated position at Lakelands. Russell Cook has also moved on as 2IC at Nudgee and is now with Globe Chemicals.

And while we're on the subject of changes, GCSAQ treasurer Dave Morrison has a new email hillsgreensrgood@hotmail.com.

ROD COOK,
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How the Hydrovar reduces energy consumption.

Most applications involve the pump operating either along its full speed performance curve or the pumps performance is throttled or regulated by a valve. The Hydrovar eliminates these operating methods by regulating pump speed and hence output to match the system demand. This saves wasted energy traditionally lost in these conventional pump systems. Energy savings of up to 70% can be realized. (figure 1)

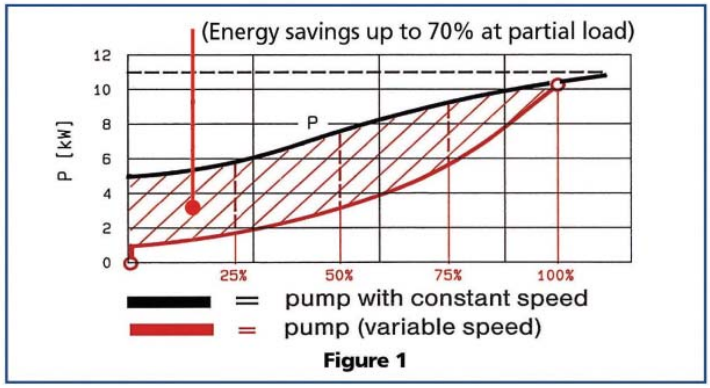

Figure 1

What is a Hydrovar?

Hydrovar has gained a reputation as the pump mounted, microprocessor pumping system controller. But it does much more than just change motor speed.

It actually manages the performance of the pump to match a wide range of system conditions and requirements.

Hydrovar is fully programmable on site as it incorporates the microprocessor and the variable speed drive in one compact and unique package.

How the Hydrovar reduces maintenance cost.

Hydrovar software is designed specifically for centrifugal pump operation, control and protection. Hydrovar can thus be setup to protect the pump from operating under various unfavourable conditions eg. cavitation, operating against closed head, low NPSHa or operation past a pumps maximum flow rate. Hydrovar will automatically shut down and alarm if adverse conditions occur.

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