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Australian Turfgrass Management Published by:

Australian Golf Course Superintendents Association ACN 053 205 888

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cover

View of second shot on the 381m par 4, 12th at Bali Nirwana Golf Club

special features

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research COMPARISON OF 11 TURF GRASS GENOTYPES DURING SUMMER IN PERTH Most are well aware of the differences in water use and drought tolerance between warm and cool season grasses. Work by Tim Colmer and Digby Short from the University of Western Australia allows us to quantify these differences and make more informed management decisions.

PLAYING QUALITY AND MEASUREMENT

John Neylan Senior Turf Consultant and regular feature writer for ATM reviews what is known on the evaluation and measurement of turf sporting surfaces and presents his own results of a field study completed at Melbourne's AFL Park.



in every edition

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Racing!

Well its October already and for those of you who have finished your spring renovations, you are most probably trying to catch your breath before planning a way through another summer. If that is the case then relax because in this edition Geoff Connellan from the University of Melbourne shows you how to test the uniformity and efficiency of your irrigation system.

Also, we have an update on a trial running at the University of Western Australia, which compares the water use of 11 turf grass genotypes and still in the west, Dion Warr from the Vines Resort introduces us to Global Positioning Systems (GPS) and their wide range of applications.

This month we feature the great work that Golf Course Superintendent Mick Russell has done at Werribee Park and we travel to "Where the Temples Meet the Sea", and discuss the finer points of golf course management in Asia with AGCSA member Phillip Knight.

It seems everything needs a number these days! John Neylan discusses the evaluation and measurement of natural turf surfaces and this month in "Review" we look at the likely impact of the Goods and Services Tax (GST) on the turf industry.

Also included in this edition is a look at a "soils first" approach with American Plant Pathologist Thomas Parent, we get deep with aeration and for a look at some AGCSA merchandise, turn to page 56.

There's plenty in this one and I hope you enjoy it!

Phil George Editor





PHIL GEORGE EDITOR



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Bali Nirwana Where the temples meet the sea....

by Phil George

A 45 minute scenic yet chaotic drive from Denpasar, Bali, Indonesia, passing service stations selling fuel in glass bottles and the world's skinniest dogs, is Nirwana Bali Golf Club and Resort.

This Greg Norman designed, 6805 yard (Shark Tees), par 72 course was opened in 1997 and for the last 18 months has been under the expert care of Phillip Knight, Australia's most ubiquitous Golf Course Superintendent.

Nirwana Bali is located just outside a small village in Tabanan Province, no more than a 2 iron from the famous Hindu temple of Tanah Lot. Such is the historic and religious significance of this site, In the words of Phillip Knight, "it is like having a golf course built next to Stonehenge" and contains no less than eleven temples within its boundaries.

To be quite honest, if I hadn't fallen in love with the place instantly, I would have been screaming bloody social vandalism from the highest mountain top.

I am certainly no Ken Venturi but Nirwana Bali is the most visually spectacular and most "fun" golf course that I have ever played. Three or four holes play along cliffs that overhang the Indian Ocean and must surely provide some of the most spectacular views in the world of golf. Others play alongside the 14 hectares of manicured

ATM

commercial rice paddies and some through dense rain forest. It's a good driving course if you are straight and there are a number of water carries that will put your irons and short game under some pressure.

Employed since 1996 by IMG, the worlds leading sports marketing and management company, as Director of Golf Course and Landscape Maintenance at Bali Nirwana, Phil also acts as IMG's regional Director for Golf Course Maintenance and over the past 27 years has managed courses in 6 different countries.

Although Phil's predecessor, had done a great job steering the course through the "grow-in" phase, a huge job lay ahead of Phil to take the course to the next level and

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bring it in line with the five star opulence of the Le Meridien Hotel complex that completes the resort.

When Phil arrived at the course in 1998 his first task was to transform the Tifdwarf couch greens, which at the time were very thin and riddled with disease. Courtesy of a 15cm layer of impermeable volcanic peat brought in at construction, root growth was very poor and insufficient drainage meant they were virtually unplayable during the monsoon. and the greens on more than one occasion looked like 'cow paddocks', the greens have come back beautifully and putt truly. Fungicide is now applied monthly instead of weekly, light renovation is only required every three months and the greens remained in play through the entire monsoon season.

Tees and fairways were also below IMG'S standards. The native 'Evergreen Bermuda' brought from Java and planted into the course

of everything that goes onto the course is viewed as standard management practice.

Although managing fine turf in a region with no local turf machinery and chemical distributor and in a climate that can be as unpredictable as it is beautiful, without question, the toughest part of Phil's job is managing a staff of an amazing 180 people.

Approximately 100 people look after the 45 hectares of golf course, 60 take care of 40



Re-construction should have been the option, but how do you tell the investors that they need to rebuild greens that are only 12 months old?

To get the greens back from here, they were put through an intensive renovation program. Within the space of twelve months the greens were cored six times with half-inch hollow tines, twice with five eighth inch tines and were vertidrained three times with needle tines. As if that wasn't enough, greens were topdressed after each renovation and were twice scarified back to the bare dirt.

Although this radical action caused numerous headaches and sleepless nights as sprigs was 'thatchy', spongy and virtually all stem. Tees and fairways were immediately scarified heavily in two directions and over the last eighteen months some of the worst areas have been done up to twelve times.

Although they looked a little hungry when I was there, fairways were pure and provided a tight golfing surface.

Fairways are fertilised with slow release fertiliser 4 times per year, tees and greens receive 1/2 kg of actual N/month in the dry season and up to 1 kg of actual N/month in the monsoon. Base slow release products are used in conjunction with of liquid organic products designed to "feed the micro organisms". Soil testing is an important part of Phil's program and maintaining detailed records hectares of landscape and a team of 20 look after 14 hectares of commercial rice paddies.

If you think you've got staffing problem's, don't read on because "Mr. Phillip" has 1 Course Superintendent, 1 Assistant Superintendent, 4 course supervisors, a full time secretary, an inventory controller and driver, 7 irrigation technicians, 9 mechanics, 3 storeman, 3 cleaners, and a team of landscape supervisors. Believe it or not, in addition to this, 5 people are employed to pick coconuts before they fall on the head of unsuspecting golfers.

A staff of that size sounds too good to be true but it must be remembered that the majority of them had never even seen a golf course before and previously had no concept of what is expected of a 5 star quality resort course. High on Phil's list of priorities is the revamping of much of the landscape and he has set about restoring a natural rugged beauty to the coastal holes whilst around the natural creeks, rice paddies and jungle areas, the careful addition of colorful native species is enhancing their beauty.

In particular, the strong but careful use of Cymbopogon citratus (Weeping Lemon Grass) has added a new dimension to the visual appeal of the course, especially where it is planted around the coastal holes, creek banks and on the large 'Alister Mackenzie' style bunkering.

I asked Phil where he was likely to go from here and he indicated that although he may be involved in a large project in Spain, it would depend on IMG. "They are such a fantastic group of professionals who understand the industry in every aspect. There are no committees, just a dynamic group of people that know how to solve problems and put ideas into reality. They truly recognize your worth, and give you the autonomy most Superintendents only dream of".

Although Phils' home is where ever he lays his hat, I couldn't help but notice that over his right shoulder hangs a spectacular photograph of Grose Valley in the Blue Mountains of NSW, 5 minutes from where he grew up. This is where his heart is and where he is sure to return.

PS. For those wishing to keep in contact with Phil his E-mail address is: freebird @ denpasar.wasantara.net.id





Bali Nirwana





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How Good Geoff Connellan Peincipal Lecture, Burnley College. University of Melbourne. Management? IS YOUR

IRRIGATION EVALUATION -A PRIORITY

The performance and management of irrigation systems should be critically evaluated on a regular basis. Many resources are involved in establishing and maintaining turf areas and water is one that is placing increasing demands on managers.

There is very little evidence that irrigation in turf areas is being comprehensively evaluated. There is often reference to the need to achieve high application uniformity however analysis of the performance of existing systems appears to be very limited. Considering the critical importance of irrigation in achieving the key management objectives of organisations, this aspect of performance justifies closer scrutiny.

The first step, in addressing irrigation performance is to identify the most appropriate performance indicators to use.

WHICH PERFORMANCE **INDICATORS?**

Assessment of the performance of an irrigation system should provide the manager with a numerical or guantitative measure that will allow the effectiveness and efficiency of irrigation to be evaluated and referenced to an industry standard or benchmark.

In the case of sprinkler irrigation systems, it is important to consider both the operating effectiveness of the system, at any point in time and the management of the irrigation over a longer period such as the 'irrigation season'. There are two types of performance indicators. One type evaluates the effectiveness of application or the uniformity of the system and the other evaluates how well the system was managed in terms the amount of water applied compared to the amount that should have been used.

IRRIGATION MANAGEMENT INDICATOR

An appropriate seasonal irrigation performance indicator is the Irrigation Index (Ii) described

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by Kah and Willig, (1992). This compares the amount of water actually applied to the estimated amount of water required over the complete irrigation season. This simple measure provides the manager with a clear measure of how well or how efficiently the system is performing and how the performance compares with other sites. An irrigated area, that is being well managed, would have an Irrigation Index value of 1.0 or less. If the li value is greater than 1.0, it would suggest that water is being wasted. In a study carried out by Keig (1994), on ten irrigated sports grounds in Melbourne, Victoria, it was found that li values ranged from 0.63 to 2.75.

The Irrigation Index (Ii) can be defined in the following way:

IRRIGATION INDEX (II) = WATER APPLIED TO SITE (WA) ESTIMATED WATER REQUIRED (WB)

Water Applied (WA)

The amount applied, expressed in millimetres, can readily be determined from total water consumption at the site and the size of the area being irrigated.

WATER APPLIED MM (WA) = VOLUME OF WATER SUPPLIED TO SITE (LITRES) IRRIGATED AREA (M2)

Note: One litre is equal to a depth of one millimetre (mm) spread over an area of one square metre.

It is important to keep records of meter readings not only at the start and end of the irrigation season but also on a regular basis throughout the season. This assists with the monitoring of the site and scheduling of the irrigation and equipment.

Water Required (WB)

The estimation of water that should have been used by the site, over a particular period or season, involves more detailed consideration. In addition to an estimate of the water use of the turf, it is necessary to consider the benefits or contributions of any rainfall and an allowance for predicted system inefficiencies or losses.

Plant water use or evapotranspiration (ET) can be estimated using local climate data, such as evaporation from the standard Class A Evaporation pan (Epan). The factor relating plant water use and evaporation readings is the Crop Factor (F). PLANT WATER USE (ET) IN MM = F X EPAN where: F - CROP FACTOR EPAN - EVAPORATION FROM CLASS A EVAPORATION PAN (MM)



The value of Epan, for the locality, can be obtained from the Bureau of Meteorology.

The value of the Crop Factor will vary depending on several factors including turf type, available soil water, management practices and importantly, the quality of turf desired. For the purpose of establishing a performance benchmark for a particular site, a value of (F), which reflects the turf category (warm season or cool season) can be assumed. The desired quality of the surface needs to be identified. Depending on the turf quality required the value of the Crop Factor can be adjusted. Handreck and Black (1991) have proposed adjustment to the crop coefficient using three categories of turf quality; (1) Vigorous, lush growth, (2) Strong growth and (3) Moderate growth.

Plant water use is often expressed as a proportion of a reference evapotranspiration (ETo) which is the water use rate of an area of cool season grass growing in full sun. In this case, the term Crop Coefficient (Kc) is used to determine the plant water use.

The following range of values of (F) for turf are presented as a guide:

Warm season turfgrasses – Crop Factor (F) 0.3 to 0.6

COOL SEASON TURFGRASSES -CROP FACTOR (F) 0.5 TO 0.8

Effective Rainfall

The proportion of rainfall that is actually used by plants, after all rainfall losses have been taken into account, is referred to as Effective Rainfall (Peff). It is difficult to accurately determine without a full and detailed analysis. However, it can be estimated by taking into account some of the factors that will influence it. These include:

 Rainfall in excess of the amount that can be stored in the root zone will be wasted due to deep drainage.

2. RAINFALL INTENSITIES GREATER THAN THE SOIL INFILTRATION RATE WILL RESULT IN SOME RUNOFF.
3. VERY SMAIL RAINFALL AMOUNTS MAY NOT RESULT IN A NET ADDITION OF WATER TO THE ROOT ZONE. IT IS LIKELY TO BE LOST BY EVAPORATION FROM VEGETATION AND THE SOIL SURFACE. RAINFALL OF LESS THAN 2 MM CAN BE IGNORED.

The estimation of Effective Rainfall (Peff) should take into account the total amount of water that can actually be stored in the soil root zone. Rainfall in excess of this capacity will be wasted. Shallow rooted turfgrasses, growing in lighter soils, will have a storage capacity in the range of 10 to 20 mm. Deeper rooting species may have a total storage capacity in the vicinity of 20 to 30 mm in light soils. A characteristic of shallow rooted turf is the limited ability to capture and store rainfall.





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Irrigation Requirement

The amount of water that needs to be deposited, by the irrigation system, in the root zone to satisfy plant growth is the net difference between the plant water use (ET) and the amount supplied through rainfall (Peff).

NET IRRIGATION REQUIREMENT (IR) MM = ET - PEFF

Due to inefficiencies, the sprinkler irrigation system needs to apply more water than the estimated net irrigation requirement (IR). Some water is lost due to wind drift and evaporation, some may drain below the root zone and there is always some unevenness in the application. The system efficiency (Ns), which accounts for these losses, can range from very low values, such as 50%, to loss values up as high as 90%. An achievable or minimum acceptable system efficiency of 75%, can be selected to provide a reference performance standard for turf sprinkler systems.

WATER REQUIRED (WA) MM

NET IRRIGATION REQUIREMENT (IR) SYSTEM EFFICIENCY (NS)

In summary, the determination of the Irrigation Index can be carried out using a relatively limited amount of data and the application of simple analysis techniques. As well as providing useful information on current performance, it provides the basis for benchmarking your irrigation against other sites and industry standards.

EXAMPLE - DETERMINATION OF IRRIGATION INDEX

SITE AND SYSTEM DETAILS

SITTE AREA: TURF: IRRIGATION PERIOD: WATER THROUGH METER: CROP FAUTOR (F). RAINFALL - TOTAL

PARE - TURF AND TREES 2.5 HECTARES (25,000 M²) WARM SEASON MIN OCTOBER TO MARCH 9,500 kl. 0.5 EVAFORATION - TOTAL EFAN: 680 MM (NOVEMBER TO MARCH) 260 MM (NOVEMBER TO MARCH)

A. WATER APPLIED BY SYSTEM (WA).

9.500,000 (Litrars) = 380 MM WATER APPLIED (WA) -25,000 (M²)

B. WATER REQUIRED (WB)

WATER USED BY TURFGRASS (ET = F x EPAN). ET = 0.5 x 680 мм = 340 мм EFFECTIVE RAINFALL: (Assume 50% OF TOTAL): 50% от 260 мм = 130 мм NET IRRIGATION REQUIREMENT (ET - EFFECTIVE RAINFALL): - (340 -130) = 210 мм ESTIMATED WATER

NET IRRIGATION REQUIREMENT SYSTEM EFFICIENCY (%) REQUIREMENT (WA): =

Assume terigation bystem application efficiency of 75% (0.75).

= 1.36 IRRIGATION WATER SUPPLIED (WA) = 380 INDER (II) = WATER REQUIRED (WB) 280

AN II VALUE OF 1.36 (WHICH REPRESENTS 136%) WOULD HOEST THAT OVER THE IRRIGATION SEASON POTENTIALLY 35% OF THE WATER SUPPLIED BY THE IRRIGATION SYSTEM WAR NOT REQUIRED.

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SPRINKLER UNIFORMITY PERFORMANCE

Distribution Uniformity Coefficient

It is not possible to achieve efficient irrigation, if the sprinkler system does not apply water uniformly. The controlled even application of a predetermined depth of water to the ground is essential to ensure water is not wasted. The uniformity of a sprinkler system can be determined by placing a number of 'catch cans', at regular intervals, within the sprinkler pattern. The system is operated for a period long enough to ensure that a measurable depth of water is collected in the cans. The preferred measure of uniformity for turf is the DU (Connellan, 1997). The DU is well suited to a turf application as it places emphasis on the areas of turf that receive low amounts of water. The value of DU is determined by comparing the average of the lowest 25% of can readings to the average of all readings. A DU of 100% would indicate that the application was perfectly even. In practice, this does not happen. It is generally accepted that sprinkler systems for turf should have a DU greater than 75%.

The value of Distribution Uniformity coefficient is calculated using the following expression:

DU = M25 x 100 (%) M where:

M - average value of all can readings (mm).
 M25 - average of lowest 25% of readings (mm).

Many factors influence the uniformity of sprinkler irrigation systems. Sprinkler spacing and sprinkler head distribution profiles are two of the key influencing factors. Operating conditions, environmental (wind) and hydraulic (pressure and flow), also directly affect the evenness of application. High uniformity is the result of good design, quality equipment and ongoing system maintenance.

Auditing Irrigation Systems

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Prior to carrying out a uniformity test on an irrigation system, it is recommended that the overall condition and effectiveness of the irrigation equipment and its operation be checked. This procedure is included, as the first step, in the Certified Landscape Irrigation Auditor (CLIA) training course developed by the Irrigation Association of USA (IA) and is available through the Irrigation Association of Australia (IAA).

Some of the problems that might be identified during this process include:

Malfunctioning of valves Sunken sprinkler heads Incorrect or non rotation of sprinkler heads Tilted heads Plugged or blocked nozzles Broken casings, missing parts Distorted spray distribution Incorrect nozzles installed Leaking pipes, valves, fittings, equipment, broken seals Cracked casings Incorrect sprinkler pressure – (high or low)

Any equipment problems observed should be identified and recorded noting the position and its controller station. This information should be recorded as part of a maintenance record of the irrigation system.

SUMMARY AND RECOMMENDATIONS

The management of an irrigation system is a key performance issue in the overall management of turf areas. The evaluation of the performance should be given a high priority. The Irrigation Index (Ii) and the Distribution Uniformity (DU) coefficient of a system provide a quantitative measure of the efficiency and effectiveness of irrigation. These tools can directly aid turf managers in achieving irrigation performance levels that meet industry best practice standards.

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IMPACT OF THE GSTON THE TURF INDUSTRY

By Jon Griffin, Griffin Jones Chartered Accountants

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If, you have a management position in the turf industry then chances are you hold the purse strings to a budget of some description. If that is the case, then read on, as the Goods and Services Tax (GST) will affect you.

ATM

The GST is an indirect tax that replaces the wholesale sales tax and a number of State indirect taxes. GST is levied on private consumption on goods, services and imports in Australia. It is also known as known as a "value-added" tax, which is collected at each stage in the production and distribution chain, as value is added to a product or service by manufacturers, wholesalers and retailers.

As part of the Howard governments' package of tax reform the GST is designed to re-apportion the tax burden from low income earners to high consumers and is the ultimate in a "user pays society".

IMPORTANT FACTS

 The GST will commence on the 1st July, 2000.

 On 1st July 2000 the wholesale sales tax system will cease and the GST will commence.

• The GST is a tax to be imposed at a rate of 10 per cent on the sale of most goods and services in Australia.

 The GST is raised every time goods and services are sold.

 Every quarter, businesses will calculate the difference between the GST included on all their sales less the GST included in all purchases made during the quarter. The balance is then forwarded to the tax office, or a refund received if the tax included in suppliers invoices is greater than the tax collected from customers.

How Will the GST work and what will it do to prices?

GOODS

Many products currently sold into the turf industry are inclusive of 22% sales tax. From the 1st July 2000 the 22% sales tax component will be removed and a 10% GST will be applied. You may think prices will fall however, the wholesale sales tax of 22% is raised at the wholesale level whereas the GST will be raised at the retail level. As a general rule prices of most goods that currently include wholesale sales tax will decrease marginally or not at all as the 22% wholesale sales tax will come off and a 10% retail GST will go on.

Prices of most goods that do not currently include wholesale sales tax will increase by no more than 10%.

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Under the current system all services are exempt from wholesale sales tax. From the 1st July 2000 all services provided will include a GST of 10%. As a result services such as soil testing, electricity, rent, telephone and consulting will be approximately 10% dearer.

The ACME Private Golf Club income and expenditure statement pre and post 1st July 2000:

The main goods and services excluded are, salaries, medical services, interest on loans and fresh food.

At this stage you have probably broken into a cold sweat wondering where the additional 10% is going to come from to pay the 10% increase in the cost of all services purchased. Do not despair the GST is a consumption tax which is ultimately paid by the consumer. Let me explain by way of an example.

		Column A Pre GST	Column B Post GST	Column C GST included In Column B Figures
		\$	s	\$
Income				
	Subscription fees received	100,000	110,000	10,000
	Other income	80,000	88,000	8,000
	Total Income	180,000	198,000	18,000
Less Exp	enses			
	Salaries	80,000	80,000	
	Insurance	6,000	6,600	600
	Chemicals	10,000	10,000	909 *1
	Furniture	23,000	25,300	2,300
	Instant Turf	1,000	1,100	100
	Hand Tools	500	500	45
	Golf Equipment (flags, cups etc)	1,000	1,000	91 *1
	Rent	5,000	5,500	500
	Electricity	11,000	12,100	1,100
	Telephone	500	550	50
	Consulting	11,000	12,100	1,100
	Fuel	20,000	20,000	1,818 *1
	GST paid	0	9,387	
Total Exp	penses	169,000	184,137	8,613
Net Prof	it	\$11,000	\$13,863	\$ 9,387

(Difference between GST collected on sales and GST paid on all inputs is sent off to the Australian Taxation Office, ATO)

*1 Items subject to sales tax pre GST therefore prices should remain the same post GST

If the ACME Private Golf Club fees (inclusive of GST) are increased by 10% on the 1st July 2000 then it would increase its net profit by \$2,863 (i.e. \$13,863 - \$11,000). The ACME Private Golf Club should increase its fees by less than 10% because of the credit gained in respect of the sales tax previously paid on goods which from 1st July 2000 will be replaced by the GST.

The amount each golf club will increase its fees will depend on the mix of goods used which prior to 30th June 2000 included wholesale sales tax.

Most organisations in the turf industry will need to register for an Australian Business Number and raise GST on all sales. When purchasing goods and services it is important that goods and services are only purchased from companies which have an Australian Business Number (ABN) on their tax invoice.

The Australian Business Number invoice will allow your golf club to offset the GST included on the invoice against the GST raised by the golf club on its subscription fees and other income.

CONCLUSION

Whether we agree with it or not, the GST will come into effect on the 1st July 2000. Although the overall effect of the GST is unlikely to be dramatic and should be fairly predictable, a simple understanding of the tax and its impact on certain items required for business is essential if you are to avoid being caught out in the "transition period".

FOR FURTHER INFORMATION VISIT: www.ato.gov.au

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DIDBY SHORT AND TIM COLMER Faculty of Agriculture, The University of WA, Nedlands, WA, 6907

A comparison of Turf grass Genotypes

Improved practice in irrigation management of turf has been identified by the WA Water Corporation and the Waters and Rivers Commission as a target area for water conservation in the Perth Metropolitan area.

However, water conservation may only be achieved by: (i) increasing the knowledge on the water requirements and drought tolerance of a range of turf grass genotypes, especially when grown on sandy soils, and (ii) effective communication of such information to stakeholder groups. In order to address these issues a "Turf Industries Research Steering Committee" was established in 1995 to bring together the major stakeholders in the WA Turf Industry, Government, and Research arenas to set well-defined goals. A concern was that relevant data on turf grass water requirements were not available to aid irrigation decisions of turf growers and managers. A research proposal was developed in consultation with our industry partners and matching funds were approved from the national Horticultural Research and Development Corporation (HRDC).

The main objectives of our research are to evaluate the water use, irrigation requirements and drought tolerance of 11 turf grass genotypes under conditions in southwest WA (listed in Table 1). The information gained should help to reduce water use via: (i) improvements in irrigation scheduling

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during summer in Perth

based on quantitative data, and (ii) the identification of turf grasses with lower rates of water use and/or a better tolerance of drought.

RESEARCH METHODS AND FACILITIES

A facility for turf grass research has been established at UWA's field station in Shenton Park, approximately 8 km east of Perth's CBD. The site provides the infrastructure required to evaluate turf under various management practices and includes: (i) a variable-speed precision boom irrigator, (ii) soil moisture monitoring system, (iii) weather station, and (iv) a series of field lysimeters. The site contains virgin Karrakatta sands of the Spearwood dune system. The experimental design and facilities enable comparisons of turf grass genotypes when grown under uniform management conditions. For more information on the infrastructure and the physical layout of the trials the reader is referred to Short and Colmer (1998).



The 11 turf genotypes were planted during mid-January 1997 in a series of 9m² plots, randomised within fifteen complete blocks. After one year of establishment, five daily irrigation treatments of 100% (control), 80%, 60%, 40%, and 20% of net pan evaporation (Epan) were imposed for an 8 week period during the summer of 1997/98;

Table 1. Turf grasses being evaluated for water requirements and drought tolerance in field plots at the UWA Faculty of Agriculture Turf Research Facility in Shenton Park, Western Australia.

Scientific name	Common name	Cultivar or selection
Warm-season turf grasses		
Cynodon dactylon	Couch or Bermudagrass	Wintergreen/Windsor Green/CT-2
C dactylon x C. transvaalensis	Couch hybrid or Bermudagrass hybrid	Santa Ana
Paspalum vaginatum	Saltene or Seashore Paspalum	
Stenotaphrum secundatum	Buffalo or St. Augustine grass	
Pennisetum clandestinum	Kikuyugrass	
Buchloe dactyloides	Buchloe or American Buffalograss	BT17
Zoysia japonica	Zoysia or Japanese lawngrass	ZT94
Cool-season turf grasses		
Festuca arundinacea	Tall Fescue	And
Lolium perenne	Perennial Ryegrass	Accent

CONTROLLED SPRINKLER SUPPLIES "Quality of product & service is the foundation of our business" each treatment was replicated three times. Plots were allowed to recover in the following autumn, winter and spring (cool-season grasses were re-seeded, warm-season plots were dethatched) and re-allocated to a second set of irrigation treatments for the summer of 1998/99. The five irrigation treatments that were imposed for a 14 week period during the second summer were: 100% (control), 60%, 50%, 40%, and 30% of Epan, again each treatment was replicated three times. All plots were re-watered at 100% Epan at the end of both summers and recoveries from water deficits were assessed.

Measurements taken over both summers included: clipping growth (weekly), colour retention (fortnightly), plant water relations (monthly), total biomass production (seasonal), root depths and densities (seasonal), and rates of extraction of soil moisture (daily).

RESULTS AND DISCUSSION

Growth and colour

Data comparing the impact of irrigation treatments for 8 weeks on the growth of the turf grasses are shown in Table 2. Clipping weights were severely reduced for all grasses at 20% Epan, at 40% Epan the warm-season grasses were less affected than the coolseason grasses and at 60% or 80% Epan clippings produced were about equal to those turf grasses irrigated at 100% Epan. The exception was Ryegrass, for which growth was significantly reduced when irrigated at 60% Epan. Although the responses of the warm-season grasses were similar, the absolute growth rates differed substantially. During the second summer the responses of the warm-season grasses showed that the minimum daily irrigation required to maintain acceptable growth ranged from 50-60% of Epan.

Turf colour or "greenness" depends largely on the leaf chlorophyll concentration (chlorophylls are the green pigments in plant leaves), therefore we have used a chemical assay for chlorophylls to quantify the effect of decreasing irrigation on turf colour. Table 2 shows colour retention for the grasses when irrigated for 4 weeks at 40% Epan, compared to the control plots irrigated at 100% Epan. The loss of colour was greatest for the two cool-season grasses (Ryegrass and Tall Fescue), with chlorophyll concentrations at 40% Epan being only half of the value compared to the controls. In contrast, the warm-season grasses retained 60-90% of their chlorophyll under the same 40% Epan irrigation treatment. grasses grown with non-limited water (watered daily) and limited water (draw down over 8 days). The water use rates for cool-season grasses were 31-36% higher than those for the warm-season grasses, under both non-limited and limited soil water availability. The higher rates of water use by the two cool-season types would result in these species becoming drought stressed more rapidly than most warm-season grasses.

Table 2. Growth (measured as clipping dry weights over 8 weeks) and colour retention (measured as total leaf chlorophyll concentration after 4 weeks) for turf grasses irrigated at 40% Epan when compared to grasses irrigated at 100% Epan (control). Mean are of 3 replicates.

Turf grass genotype	Clipping dry weight	Leaf chlorophyll retention
	(% of control)	(% of control)
Couches (3 cultivars pooled)	84.5	81.3
Couch hybrid	96.1	75.7
Saltene	93.3	78.7
Buffalo	90.7	83.0
Kikuyugrass	96.7	78.9
Buchloe	81.4	90.6
Zoysia	75.2	61.6
Tall Fescue	57.2	47.7
Ryegrass	29.4	54.7

Root growth and soil water extraction

Turf species that have the capacity to explore a large soil volume for water have a distinct advantage when soil moisture availability declines (Marcum, et al., 1995; Carrow, 1996). Ryegrass, had 86% of all roots situated in the top 10 cm and no roots below 20 cm, even after 1.5 years of growth. In contrast, most warm-season grasses had 50-60% of root biomass in the top 10 cm with the remaining proportion of roots at greater depths. In some cases roots were found as deep as 100-150 cm. Consequently, as rainfall or irrigation inputs decline over summer, warm-season grasses have the capacity to survive for considerably longer periods of time (3 weeks at 20% Epan) compared to cool-season grasses (1 week at 20% Epan).

Weighing lysimeters installed into the field plots were used to measure the rates of water use from selected turf grass genotypes. Table 4 shows the water use rates as a percentage of daily Epan for



VARABLE SPEED PRECISION BOOM IRRIGATOR



Contact your local branch on Free Fax: 1800 444 448 Free Call: 1800 806 323 Table 3. Ratings of turf grass root exploration based on measurements for root distribution and density

Turf grass genotype	Root exploration rating
Couches, Couch hybrid,	
Kikuyugrass, Buffalo	Excellent
Saltene	Very good
Buchloe, Zoysia,	
Tall Fescue	Good
Ryegrass	Poor

Table 4. Water use rates for turf grasses grown in lysimeters in field plots in Shenton Park, Perth. Lysimeters were weighed every 24 hours and changes in weight were recorded as water use. Any through flow of water was also collected, measured and taken into account when calculating water use. Data given are means of 3 replicates.

CONCLUSIONS

The research to date has found that the minimum daily irrigation required to maintain acceptable growth and colour over summer (8-14 weeks) ranges from 50-60% of Epan for several warm-season grasses and 80-100% of Epan for two cool-season grasses. This general finding was supported by the data showing lower rates of evapo-transpiration and the deeper root systems in the warm-season grasses when compared to the cool-season grasses. Also, the recovery abilities of the warm-season grasses following periods of low water availability were superior to those of the cool-season grasses. It should be noted however, that the present work has

Turf grass genotype	Water use as a % of daily Epan in non-limited soil moisture	Water use as a % of daily Epan in limited soil moisture
Ryegrass	100	84*
Tall Fescue	100	92
Buffalo	69	59
Kikuyugrass	68	58
Zoysia	68	62
Saltene	67	57
Couch (Wintergreen)	64	56
Bare sand	50	25

*The water use rate of Ryegram was lower than expected due to wilting and senescence over the 8 day draw down period. Water use results are presented as a percentage of the daily net pan evaporation (Epan).

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ACKNOWLEDGMENTS

We thank the members of the UWA "Turf Industries Research Steering Committee" for their advice and enthusiastic support during this project. The research is supported by the Horticultural Research & Development Corporation (Project TU96002), the WA Turf Growers Association, Organic 2000, Micro-Control Engineering, WA Water Corporation, and WA Waters & Rivers Commission. In-kind support from Sentek Environmental Innovations, Agrilink Water Management, The Golf Course Superintendents Association of WA, The Cities of Stirling and Melville, Turbo Mulch, Casuarina Earthmoving & Transport, ALROH Turf Machinery, Nelson Australia, Total Eden Irrigation, and Sentinel Gardens Pty. Ltd. is appreciated.

* Digby Short is a Ph.D. research student and Dr. Tim Colmer is the turf grass project coordinator and a lecturer in Plant Sciences at UWA. This article is a summary taken from a presentation at the 4th National Turfgrass Seminar in Perth, Western Australia during July 1999

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Golf Course Superintendent – The Vines Resort, Perth

Technology for Golf Courses

GPS (Global Positioning System) and more importantly DGPS (Differential Global Positioning System) are now readily available at low cost and combined with a low cost CAD (Computer Aided Design) package are perfect for achieving the following on Golf Courses.

- Distance measuring
- Sprinkler head marking
- Determining the exact location of the centre of a green.
- Valve box marking
- QCV Marking
- · As constructed drawings of Irrigation
- Marking of 100m 150m 200m distance to Green markers
- · Area measuring
- · Location of any asset i.e. (Pumps, Bores)
- Relocation of any recorded items (QCV, Mainline etc)
- Can be used in construction for marking out fairways etc.

• Provide accurate documentation and records for all underground services.

- · Calculating area of Greens, Tees, etc.
- · Location of boundaries
- · Tracking of vehicles
- Can be combined with moving map software for visual location of position.

All of these can be done with ease and all can be expected to be accurate to within 1 metre. A good DGPS system will give 1m accuracy - if you walk with one you can see the screen count down each meter as you walk. These units will also give accurate speed readings and are therefore useful for the calibrating of application equipment.

WHAT IS GPS AND DGPS

GPS stands for Global Positioning System. Developed by the United States Department of Defense as a 24-hour a day, 365 days a year global navigation system for the military. Civilian availability was added with less accuracy using the same satellites. Twenty-four satellites orbit the earth. Three of these satellites are spares, unused until needed. The rest virtually guarantee that at least four satellites are in view of anyplace on Earth at all times. You need three satellites to get a 2D fix and four satellites to get a 3D fix - that includes altitude. Unfortunately due to ionospheric and troposperic delays, and errors deliberately added by the Department of Defense, GPS can only be relied upon to provide accuracy of approximately 100 metres. This is of course no good for locating a valve box on a Golf Course. However if a GPS unit is installed at a known location the error can be calculated by establishing the differential between what the GPS is saying and what the actual position is. This differential can then be transmitted to a receiver in less than 1 second. The receiver can then transmit the differential correction to another GPS making that GPS accurate to within 1 metre. This is known as DGPS Differential Global Positioning System. Now with a DGPS system you can confidently measure distances and locations on Golf Courses.



WHAT DO YOU NEED TO ACHIEVE THIS AND HOW MUCH DOES IT COST?

- · A computer (Pentium or higher 32Mb Ram)
- A DGPS ready GPS
- A DGPS Receiver
- A CAD software program
- Aerial Photograph
- Utilities to upload and download from GPS to Computer
- · Subscription to a DGPS signal.

The total cost including a PC is around \$6,000.00. If you already have a suitable PC then you are looking at around \$4,000.00 -4,500.00. If you have a PC and a digital photograph then about \$2,800.00

HOW IT ALL WORKS.

Once you have an aerial photograph you can have it scanned, corrected and burnt to a digital image on a Compact Disk. AutoCAD Light is a CAD program that costs around \$900.00. AutoCAD can read the image from the compact disk and load the calibrated photograph onto your computer screen. Once this is done you can achieve the following.

- Measure any distance from one point to another for example back of tee to the front of a green.
- Calculate the area of anything on the photograph i.e. a golf green, fairway, tee etc.
- Place your mouse cursor anywhere on the image and get the coordinates for that position.
- Input those coordinates into a GPS and then the GPS can take you to within 1m of that spot.

- Store required data (overlays) over the top of the image. i.e. irrigation system.
- · Zoom in and out to display required detail

Example of measurement from back of tee to the front of a green.



Note, to calculate the area of any object you first need to draw a line around it You can then save the line around your green on a "layer" called say "Greens". Eventually all of your greens will then be on the greens layer and you will have the most accurate area information for all greens. This then becomes a permanent record.

AutoCAD will have the aerial photograph as a base and you can overlay anything over the photo like the Irrigation system - you can even print it. Combine the CAD package with a DGPS and you can then transfer information from the DGPS to the CAD package or vise versa - this means you can look up the location coordinates of a valve box on the computer then input those coordinates into the DGPS and then the DGPS unit will take you to that valve box.

- The CAD package has precise accuracy to less than 1mm
- · The DGPS system is accurate to 1m

If you were to drive around the golf course and then download the data from the DGPS and plot it on the CAD system it

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Example of a vehicle driving on road.



CONCLUSION

In short the above system provides a complete management system for all measurement and location requirements for Golf Courses. In addition you can print any portion of the image at any scale. This is useful for issuing to staff or contractors. The system is compatible with most other CAD systems enabling the likes of engineers or golf course architects to e-mail you overlays that can be put directly over your images. E.g. a new hole design can be overlaid over the existing hole and viewed, compared, printed etc.

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EXAMPLE OF IRRIGATION MAINLINE OVERLAY

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CALCULATION OF THE AREA OF A GREEN

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At the 1995 A.G.C.S.A. National Conference in Adelaide I sat in stunned silence as Ms Penny Figgis from the Australian Conservation Foundation branded golf courses as purveyors of 'environmental vandalism'.

I could have simply dismissed these comments as unfair and uninformed but instead they galvanised a resolve to prove her wrong. Fours years later I feel honoured and proud to have been awarded the 1999 AGCSA Claude Crockford Environmental Award and feel as though I have found a way to prove that golf can be of benefit to the community and the environment.

Built mainly by volunteers on 75.5 hectares of land, which had previously been used as grazing land for cattle and sheep, Werribee Park Golf Club was officially opened in December 1976. It is situated 35km south west of Melbourne and 3 kms south of the Werribee Township within the rapidly expanding City of Wyndham. Positioned adjacent to Werribee River the course is regularly flooded. Reputedly one of the fastest flowing rivers in flood in the Southern Hemisphere, flooding results in the wash-out of bunkers and greens, deposits of silt and weed species, loss of remnant vegetation (i.e. redgums) and damage to irrigation.

In addition, areas of the river bank were eroding by up to one meter per year, prompting the club in conjunction with the City of Wyndham and Natural Resources

(28)



BY MICK RUSSELL, GOLF COURSE SUPERINTENDENT AND WINNER OF THE 1999 AGCSA CLAUDE CROCKFORD ENVIRONMENTAL AWARD

and Environment to embark on a large-scale riverbank re-establishment project along the 14th fairway. This was extremely successful but it wasn't until hearing a presentation given by Landcare and Land for Wildlife at a State Superintendents' meeting that I became interested in the Land for Wildlife 'concept'.

After speaking with representatives from Land for Wildlife and getting an outline of the processes the club was required to go through, I presented the idea to the Club Manager and Committee. Some initial concerns regarding loss of control of the land were raised but eventually it was decided to continue with the process and apply for registration.

The first step was to organise an inspection of the site with representatives from the Land for Wildlife group to inspect the site and log all points of interest such as vegetation, habitat, animal species and numbers.

Some weeks later we received a report from Land for Wildlife to say that the assessment had determined that the site would be a valuable contributor to Land for Wildlife and that the remnant vegetation and habitat areas were of great value. The report also stipulated that we would require a longterm environmental management plan before the registration could be accepted.

After reading this report I sat back and thought that's easy enough I'll whip up a plan in a couple of weeks and we can get started. How wrong I was. After looking at what was required to do the job properly I realised that this was not going to be a simple task.

During the next couple of months I attended environmental seminars to learn about revegetation techniques, plant identification, weed control and planning. The more information I gathered the more I felt I needed but it was a tremendously interesting process and I became increasingly excited about preparing a comprehensive, meaningful environmental management plan which addressed a range of issues such as habitat maintenance, Redgum management and waste disposal.

Nine months later the management plan was completed and in October 1998 the 'Werribee Park Golf Club Environmental Management Plan' was accepted by both the Club and Land for Wildlife and the site approved and registered on the Land for Wildlife program. The plan has a 'vision' and that is to bring neighbouring properties and community groups together in restoring and enhancing the wildlife corridor along one of the most degraded river systems in Victoria, the Werribee River.

Registration with the program and subsequent restoration work has generated tremendous interest from the local media and developed an awareness amongst members and public golfers of the value of golf courses in providing habitat for flora and fauna.

Where once revegetation work had drawn criticism from members who thought time would be better utilised by mowing greens and fairways, education and 'selling' the benefits of what is being done has encouraged members to be supportive and take an active interest in the environmental health of the course.

Although an increase in wildlife is an obvious benefit of revegetation, establishment of these areas allows us to spend

more time on maintaining and improving the golf course. This is not just good for the environment it is good for the business of golf as well.

As the native vegetation matures selfregeneration of various species becomes evident and it begins to out-compete weed species. Native birds such as grass parrots like Red Rumps and Purple Banded Lorikeets are returning to the area to feed on native grass planting's. They then spread seed along riverbank areas where they nest in tree hollows. Birds of prey such as Whistling Kites and Falcons are also returning in significant numbers due to the abundance of smaller birds and reptiles. A platypus colony located along the riverbank of the 7th fairway has created a great deal of interest and has provided the impetus to apply for various funding grants to assist with revegetation and restoration of this significant area. The Club has recently received notification that at least one of these applications has been successful.



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Dictated by available finances, revegetation work has been carried out in a variety of ways. Most work is undertaken by clearing unwanted plant material and replanting with tubestock grown on from seed collected on site. Methods of weed control range from chemical control, manual removal and the use of old carpet and mulch to provide weed barriers.

Other areas have been designated as 'no mow' areas to provide an opportunity for germination of indigenous seed already in the soil. This has also proven very successful but does look untidy until some germination becomes evident. These areas are usually limited to out of play areas to minimise problems associated with lost balls.

This whole process has brought me into contact with many different groups of people and has given me an opportunity to speak at the meetings of various organisations interested in what is happening at the club and what we have learned.

I was nominated for the 1999 AGCSA Claude Crockford Award by my club manager but thinking that we had no real hope of winning I didn't give it too much thought. It was not until I read the nomination letter and received notification that I was a finalist that the importance of this award started to sink in.

Whilst preparing all the documentation required for the Award interview I began to realise just how much had been achieved and how much of the work we do as superintendents goes unnoticed even by ourselves.

Winning the 1999 AGCSA Claude Crockford Environmental Award is the highlight of my career in the turf industry and has given me confidence and belief that the work we do as superintendents can be extremely beneficial to the environment, community and the golf industry. It also helps in raising the profile of our profession and I would like to encourage all superintendents to nominate for this award. For me it has been a tremendous learning process and can only be of benefit to your career.

Acknowledgments:

For their help and support I would like to take this opportunity to thank the following;

- · My wife and family.
- . Long time members of the Club Alan Thompson and Brian Candy.
- · John Geary, Steve Tuckett and Rod Fenton.
- Werribee Park Golf Club Directors and



View across the 14th failiway 1985 COMPARISON TO THE SAME VIEW IN 1999



Members for giving me the opportunity to undertake this work and their support during my employment at the Club. CHIPCO AND THE AGCSA – SPONSORS OF THE CLAUDE CROCKFORD ENVIRON-MENTAL AWARD.



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One thing leads to another. Professional turf management describes the techniques of intervention that maximise turf health and minimise pest, weed and disease attack.

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(34)



Many playing fields, golf course fairways, racecourses and 'passive' turf areas have experienced severe soil compaction and surface damage. This is increasingly the case on sports fields in particular as timetables become more demanding and less flexible, often forcing play onto grounds that are simply not suitable for play.

Although only part of the solution, soil aeration is a well known remedy to these types of problems. Accepted techniques include: coring, spiking, slicing and deep tine aerating. For the purposes of this article we will discuss in more detail deep tine aerating (often referred to as vertidraining), coupled with topdressing to gain the maximum benefit and recovery from damage to your turfed area.

Deep tine aeration using solid or hollow tines has the potential of penetrating the soil to a depth of up to 400mm. Once the tine has reached maximum depth of penetration, most deep tine aerators perform a 'heaving' action which helps to shatter deep seated compaction and hard pan layers, thus improving the water to air ratio or 'aeration porosity' of the soil root zone. Since the 'heaving' action is undertaken under the surface and the tine is withdrawn from the same hole that it entered, disturbance to the surface can be minimal.

Given adequate soil temperature, day length (hours of sunlight) and nutrient levels increased aeration porosity generally promotes a significantly improved root system. This results in a plant much better equiped to cope with and recover from wear and pest and disease invasion and is able to make more efficient use of water and fertiliser. The net result of all these things is of course a more aesthetically pleasing surface that provides a superior playing surface.

Deep tine aeration is also known to improve drainage and reduce the ponding of water on





the surface, which reduces the grounds' susceptibility to damage sustained by traffic from people or machinery.

Top dressing is also well documented to have multiple benefits to turf areas. These include, reducing surface undulations and filling 'potholes' thus restoring the original surface configuration that should allow for the surface drainage (run off) of excessive water. Topdressing with a relatively course material such as sand when done in conjunction with deep tine aeration i.e., filling the tine holes with sand can be beneficial in that improved aeration and drainage may be maintained for longer.

One word of caution though! Topdressing with a material that is incompatible with the original surface can lead to quite significant problems. For example, topdressing a sports ground built from a fine soil that has poor drainage and poor surface configuration with a sand will result in a distict layer that is likely to become unstable and 'soupy' when it is wet. Conversely, in hot dry conditions the top sand layer will dry out much quicker than the underlying material. Topdressing a sports ground that has a sand profile with a fine type material can result in 'surface sealing' that will restrict the penetration of water and air and could result in poor root growth and 'black layer'.

For these reasons it is important that all topdressing material be thoroughly tested for compatibility by approved laboratories that will also check pH and salt levels which could have a negative impact on plant growth if these levels are not within a range suited to the particular turf species. It is also important to source any topdressing material from a trusted supplier so as to ensure uniformity. It is also prudent to inquire as to the availability of the material in the future so as to avoid having to go through another searching and testing program that can be time consuming and expensive after only one or two seasons.

If done correctly with carefully selected and tested products and with specialized machinery, deep tine aeration and topdressing will combine to facilitate optimum soil aeration and drainage thereby, gaining maximum benefit for your turf area.

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ATM

PLAYING QUALITY & MEASUREMENT BY JOHN NEYLAN



There are increasing pressures being placed on turf managers to improve and maintain high quality sporting surfaces. With many sporting surfaces now being maintained by contractors, it is important to have some form of objective method to assess performance. The Australian Football League has a set of criteria with which they assess the safety of the playing surface. As a result these standards are working their way down to the lower levels of sport. This has in fact resulted in the closure of some suburban grounds. Although subjective, it does at least provide a systematic method of assessment.

To achieve a high standard of player safety, the quality of the sportsfield is of paramount importance. A sportsturf surface should be judged by how well it plays as well as its overall appearance, turf cover and colour. The playing quality is dependent upon the physical properties of both the immediate surface layer and the underlying material i.e., soil and sward characteristics. The two main factors effecting playing quality are player-surface interactions and ball-surface interactions, which are made up of several components including:

Bell et al (1985) and Baker and Canaway (1993) both provide an excellent review on these interactions and associated testing procedures.

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Player-surface interactions

- · Friction and traction
- Ball bounce resilience

Ball-surface interactions

- · Hardness and resilience
- Rolling resistance
- · Friction and spin

PLAYER-SURFACE INTERACTIONS

Friction and traction

Friction and traction allow the necessary player movements without excessive slipping. Friction applies to smooth soled shoes and traction to shoes having studs, spikes or cleats which provide extra grip. Excessive friction/traction is undesirable, as there is a risk of knee and ankle injuries. Too little friction/traction is also undesirable, as there will be increased slipping and falling.

There are numerous test procedures used to measure surface friction and traction. These include; pendulum tests to measure translational friction, towed sledges to measure friction on artificial surfaces, the distance a trolley with a test foot slides after being released down a ramp and the measurement of the torque required to cause slippage of a studded disc.

Hardness and resilience

The hardness of a surface is defined as the ratio of an applied force to the amount of surface deformation (ie. stiffness).

Resilience is a measure of the amount of energy returned to the player from the surface after impact, as a proportion of the energy put in before impact. Both these factors are important in respect to running, falling and injury potential. Hard surfaces can cause jarring of limbs and muscle soreness and increase the risk of injury from falls while a surface that has low resilience can cause player fatigue.

The Clegg Impact Soil Tester (CIT) which measures the deceleration of a weight dropped from a fixed height is the most common method used for testing surface hardness. In 1996 the American Society for Testing Materials (ASTM) adopted a standard procedure for determining the shockattenuation characteristics of natural turfgrass surfaces using the CIT (ASTM F1702-96). Other test methods that have been employed use the penetrometer, and the Stuttgart and Berlin Artificial Athlete. Both measure surface deflection under a falling weight.

The Clegg Impact Soil Tester has been used extensively on cricket pitches. Clegg (unpublished, 1982) used a 0.5kg hammer released from a height of 300mm at the Western Australia Cricket Association (WACA) Ground in Perth, during a 3 day match and produced the following values as a guide for grounds preparation (Table 1). Table I. Clegg Impact Test (CIT) values on a cricket pitch at the Western Australian Cricket Association (WACA) ground.

Period of measurement	Range of values (Gravities)
2 days prior to game	320 - 390
1 day prior to game	400 - 500
1st day of game	520 - 590
2nd day of game	640 - 730
3rd day of game	660 - 740
Day after game (pitch watered)	310 -370

These results were related to soil moisture content and ball bounce and are similar to those observed by Lush (1985). In New Zealand the penetrometer has been used as an aid to preparing cricket pitches by measuring soil hardness and relating this to soil moisture content and ball bounce (McAuliffe and Tuohy, 1987).

BALL-SURFACE INTERACTIONS

Ball bounce resilience

Ball bounce is important in many sports including Soccer, Australian Rules and Cricket. The ideal height of bounce varies for different sports with the consistency of bounce from one part of the field or pitch to another being of most interest.

Ball bounce resilience is used as a measure of bounce and is the ratio of the height the ball bounces to the height from which it is dropped. The actual drop height is not important provided that the rebound height is expressed as a percentage of the drop height. However, a drop height of 3m has been found to be convenient and is widely used for soccer. Generally, ball bounce resilience is highly correlated to surface hardness measurements.

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Stewart and Adams (1968) produced a scale relating ball bounce to cricket pitch pace. They dropped a cricket ball from a height of 4.88m and measured the rebound height (Table 2).

Table 2. Ball bounce resilience (BBR) and its relationship to cricket pitch pace.

Ball bounce	Pitch pace
> 15.6	very fast
13.0 - 15.6	fast
10.4 - 13.0	moderately fast
7.8- 10.4	easy paced
< 7.8	slow

Rolling resistance

The rolling resistance is a significant factor in sports where the speed of the surface is important such as golf, bowls hockey, cricket (outfields) and to a lesser extent soccer. It can be measured in terms of ball deceleration or the distance rolled by the ball. The two main measurement techniques involve propelling a ball with a standard force or releasing a ball down a ramp and then measuring the ball roll. A more sophisticated apparatus involves the use of several infrared timing gates set at standard intervals, which are then used to measure the deceleration or the change in velocity.

Golf and lawn bowls are the only sports that have incorporated the measurement of ball roll into standards for rating greens. The stimpmeter is used in golf for rating green speed, while in bowls various testing ramps have been used for assessing the speed of bowling greens.

Friction and spin

The friction between a ball and surface is responsible for the variations in speed, direction and rate of rotation of a ball after contacting a surface. These are important properties in tennis, golf and cricket. There are many complex interactions between horizontal velocity, spin, bounce and friction thus, measurement has generally relied on video analysis or equipment capable of electronic detection.

Players perception

If these tests are to be useful, the results must relate to the user's opinion of the surface so that the results can be interpreted in a meaningful way (Baker and Canaway, 1993). Canaway et al (1990) used player questionnaires to interpret the results from the test measurements. They describe the players as being notoriously variable in their responses and that a large sample is very important. The results of the questionnaires then provided acceptable limits for measurements related to ball rebound, ball roll, traction, hardness and surface evenness. In relation to interpreting the physical measurements in terms of injury potential, Baker and Canaway (1993) suggest that player questionnaires are not particularly useful.

Even though there are numerous testing procedures available there has been only minimal adoption of playing quality standards for particular sports. Test methods and performance requirements have been established for soccer pitches in the United Kingdom and standards based on performance have been derived for hockey, rugby, golf and lawn bowls.

ASSESSING PLAYING SURFACES – A FIELD STUDY

Even though there are established methods for determining surface characteristics there is still a lack of information on what are considered to be acceptable limits. To develop comparative criteria requires extensive and detailed research. However, for particular situations objective assessment techniques can be used to monitor changes in the surface over time. These techniques can be used to benchmark the condition of the surface at a particular point in time for future reference.

Following the resurfacing of an AFL teams training venue, the performance of the surface was monitored over a 12-month period. The assessment criteria included: % turf cover (the turf cover was determined on a 10m x 10m grid across the entire ground – about 180 observations), surface hardness (using the Clegg Impact Soil Tester), infiltration rate, traction (Canaway, 1986) and hours of usage.

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The sportsfield is a highly used facility with an AFL team and an U18 team, which utilise the field almost on a dally basis over a 10month period. Usage consists of both training and matches. The purpose of the study was to monitor the changes related to ground usage.

The results of the monitoring did not reveal anything that we have not observed on many sportsfields, but it did allow observations to be quantified. In figure 1 the change in turf cover is compared to the hours of use. As would be expected, the rate of turf

Turf Cover Nth Goal %

Figure I Oval Assessment Turf Cover (%) vs. Hours of Use



deterioration is greatest during the winter

months. The most interesting outcome was

the rapid deterioration on one weekend (5

June 1998) as a result of four games and a

training session plus 45mm of rainfall.

The infiltration rate was measured at six

locations on the sportsfield and the results

at one location are shown right in figure 2.

As would be expected, towards the end of

sealing has occurred which results in a

reduced infiltration rate.

the football season, surface compaction and

PLAYING QUALITY & MEASUREMENT

Figure 2 Oval Assessment Infiltration Rate (mm/hr) vs. Hours of Use



Traction was relatively consistent over the assessment period. However, the general trend was that traction was greatest where there was a good turf cover. Traction tended to be highest in the areas of low wear (figure 3) though in bare areas satisfactory traction could be achieved by maintaining high soil moisture and rolling the surface.

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Figure 4 details the wear patterns across the ground. The goal to goal line (sector G-H) exhibited the greatest turf loss with the goal squares and the center of the ground worst affected. Sector D-E was on the grandstand side of the field and locations 3-11 was where training was most concentrated. Sector K-L represents the far side of the field (low use).





Surface hardness was dependent on soil moisture content and grass cover. The most noticeable result was that towards the end of the football season surface hardness was substantially greater in the high wear areas where there was a very poor turf cover (refer to figure 3). Where there was a lack of turf cover soil moisture content and rolling dramatically affected surface hardness.

PLAYING QUALITY & MEASUREMENT

The assessment quantified and confirmed several important factors affecting sporting surfaces used for Australian Rules football;

(i) Concentrated training activities cause severe turf deterioration.

(ii) The combination of wet weather and high usage causes rapid turf deterioration.
(iii) Most of the wear is concentrated on a relatively small proportion of the field.
(iv) Infiltration rate deteriorates with increasing hours of use.

(v) Traction is best where the turf cover is highest.

(vi) A good grass cover potentially reduces surface hardness.

For this particular sportsfield, the ground managers were able to make management/ maintenance decisions based on the data collected. Such decisions include; rotating training locations, renovation requirements and safety.

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AGCSA STAFF





AGCSA

Within one year a full time director was appointed and now, some eight years later, the Association employs four full time staff, has its own office and provides a wide range of services to its members and the wider turf industry.

The Associations magazine ATM after only five editions already has over 6000 readers and is the leading magazine of its type in the region. A key function of the AGCSA is the provision of education to its members, achieved by staging regional workshops, annual conferences and trade shows. In collaboration with a number of other turf industry groups, the AGCSA will be staging the Millennium Turfgrass Conference in June 2000 at the Melbourne Exhibition Centre. Run over 5 days the event will feature a number of local and international speakers, the largest turf trade show ever seen in Australia and is expected to attract over 3000 delegates.

EUAN LAIRD - C.E.O.

After graduating from the University of Melbourne with a degree in Agricultural Science, Euan worked at the Turf Research Institute in Frankston under Terry Woodcock for 4 years and then with Turfgrass Technology P/L for another 2.

Although he will say he was simply "in the right place at the right time" Euan was the perfect choice to run the Association and since 1992 he has done a tremendous job in consolidating on its sound reputation and strong supporter base.

Euan remains committed to the goals of broadening membership services and promoting the professionalism and skills of its members.

Euan is into anything outdoors and it just about to build a house and revegetate a block of land in Upper Beaconsfield.

VIRGINIA THOMPSON - Administation manager

After completing a Diploma of Business (Tourism Management) in Adelaide, Virginia moved to Melbourne in 1991.

Virginia has a wealth of administration experience and has been employed by Womans Golf Victoria, City of Camberwell, AAT Kings Tours and Peregrine Adventures.

She has been employed by the AGCSA since 1998 as the Administration Manager and is the glue that holds together seamless conferences and seminars.

Virginia's main aim is for her and husband Darryl to complete renovations to their home. She enjoys gardening, reading, playing golf and walking "Max" their dog.

PHIL GEORGE - Publications Manager

After graduating from the University of Western Australia with a Science Degree, Phil moved to Melbourne in 1995 to work as a Researcher and Consultant under John Neylan at Turfgrass Technology P/L.

In January this year Phil moved to the AGCSA to create the Australian Turfgrass Management (ATM) magazine and loves the challenge of developing a quality publication that holds interest and appeal with all sectors of the turf industry.

Phil loves life in Melbourne and recently picked up his second premiership medallion with the Club 18 "Crocodiles".

CHRISTINE LINDSAY - Trainee

Christine completed Year 12 at Maroondah Secondary College in 1998 and in late 98 she applied for a traineeship with the AFL Sports Ready Scheme. She was successful and gained a part-time position with the AGCSA. The scheme combines on-job training with days studying at the Victorian University. At the completion of 1999 Christine will gain her Certificate in Sports Administration.

Her major achievements for 1999 (so far...) include appearing as AFL Trainee of the week in the AFL. Footy Record, passing her driving test and holding the snake at the 4th National Turfgrass Seminar.

Christine enjoys going out with her friends, loves loud music and is an enthusiastic Bombers supporter. Her ambition is to actually set foot on a golf course!

ATM

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Biologica

By Thomas Parent



Biological turfgrass culture involves maximising the health of your soil and the health of your turf so that reliance on pesticides can be reduced. The key is the use of soil friendly fertilisers and soil amendments. Healthy turf is more able to defend itself against predators and disease. Biological turfgrass culture can be summed up by the expression "Soil First." Biological turfgrass culture can lead to significant reductions in water usage, and up to a 70% reduction in fertiliser and pesticide use.

TEST AND BALANCE YOUR SOILS:

The first step in biological turfgrass culture is to understand your existing soil conditions, and this can only be determined by undertaking rigorous soil testing. At a minimum, you would want to perform tests on your best and worst areas.

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SOIL STRUCTURE

Soil has a minimum of three fractions:

Mineral

- Organic
- · Biological.

The goal is to bring all three into balance to provide the perfect medium in which to grow turfgrass. Traditional turfgrass culture has focussed almost exclusively on the mineral fraction and more specifically on three minerals, NPK.

SYDNEY CRICKET GROUND -

An Introduction to Biological Turfgrass Culture

Biological turf culture, whilst recognising the importance of these specific elements, takes a broader view. It considers not only all of the essential minerals needed by the plants but also the soil biology. The goal is to achieve a balance of all nutrients in specific ratios to maximise plant uptake. Biological turfgrass managers analyse the amount of organic matter first and then the percent of base saturation of Calcium, Magnesium, Potassium, Hydrogen, and Sodium when reviewing soil tests. In particular specific ratios of the bases and of Calcium and Magnesium are looked for.

Base saturation, is a measurement of how much of the soils available nutrient holding capacity is occupied by a particular base.

Work at the University of Missouri by Dr. Albrecht showed that the Calcium/ Magnesium ratio was the key. This ratio governed the absorption and utilisation of many other essential minerals by the plant. Dr. Albrecht discovered that the ideal base saturation of Calcium was 60-70%, Magnesium 10-20%, Potassium 2.5-3.5% Hydrogen 10-12%, and Sodium <3%. He discovered that these ratios, if combined with ample supplies of minor minerals, phosphorous and 5% organic matter, resulted in the ideal soil to grow most crops.







THE COAST GOLF CLUB

SOIL BIOLOGY

Biological turfgrass management aims to provide an environment where beneficial organisms thrive to assist your plant. The first step is to open your soll as discussed in the first section by balancing the base saturations. The second is to ensure that the microorganisms have everything they need to proliferate. Microorganisms, like plants, need more than NPK to survivel Thatch accumulation is a key sign of a soil with low biological activity. Thatch often forms because earthworms and naturally occurring macro and microorganisms are poisoned to extinction. Contrary to popular belief, thatch accumulation can be worsened by collecting clippings. In removing clippings we remove a source of readily digestible organic matter, short circuiting part of the carbon cycle and we are also removing a complex array of potential nutrients. These nutrients are often replenished by adding salt based acidifying fertilisers, degrading the soil environment further.

A biological turf manager does everything they can to maintain high levels of soil life whether this be destructive insects or bacteria. They realise that almost everything that is alive in the soil is for the benefit of the plant and also that if they have a problem with their turf, they have a problem with their soil. There are no soils with insecticide or fungicide deficiencies!

When the ratios listed above are achieved, the pH of the soil will always be between

pH 6.3 and 6.5. Here is the profound but subtle difference of the "Albrecht Method". Instead of relying on pH to determine if lime or gypsum is required, the determining factor is the ratios of base saturation. Forty years of research on the worst soils in America have proven this method. Although Dr. Albrecht did not perform his work on a golf course or sports field, the technique has been successfully adapted to turfgrass culture with great success. Your job as turf managers is to bring the soil into balance. To do this we use high calcium lime to raise the base saturation of calcium and/or to lower the levels of magnesium or sodium. If calcium levels are good and magnesium and/or sodium levels are high, which is a common occurrence, you would apply gypsum and sulfur based fertilisers. To maximise a soil you want to begin by balancing the mineral portion of the soil. A good indication your soil needs work and you need to run soil tests is if the effects of aerification are short lived. This often indicates high sodium or magnesium levels or low calcium. Remember that calcium loosens soils and the other bases tighten soils. The best aerifer in the world is no match for poor soil chemistry.

BIOLOGICAL THATCH REDUCTION AND SOIL LIFE.

The other half of biological turfgrass culture is the management of soil biology and organic matter. Think of the soil and its diverse mixture of life as the stomach of the



- promotes deep and massive root systems
- boosts beneficial microbes
- improves wetting and spreading of water
- breaks down thatch and waste
- reduces sodium salt in the rootzone



Biological



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plant -DON'T" GIVE IT ANYTHING THAT WILL GIVE IT INDIGESTIONI E. E. Pfeiffer who was one of the founders of biodynamic agriculture in America used the following expression: "Feed the soil and the soil will feed the plant." This is the opposite of applying "Plant Food". Most of the fertilisers used in turf today are of the plant food variety and some containing potassium chloride, are destructive to the soil. This does not mean we all need to all rush out and buy 100% certified organic fertilisers. There are a variety of products that are between "organic" soil food and NPK plant food. Products such as kelp extracts, carbohydrate fertilisers, composts etc. fill in the nutritional gaps and feed the populations of microbes waiting to work for you.

Budgets vary considerably but even under the tightest budget control, biological turfgrass culture can be achieved. The key to turfgrass health under this type of low budget constraints is small doses. Putting the wrong fertiliser down in small amounts will give your soil only a small stomachache. With slightly larger budgets, the task of "feeding the soil" becomes easier. There are a variety of fertility products on the market that are more soil friendly than straight NPK. Composted products from sewage sludge to poultry litter have been available for years. Whether true compost or manures the advantage of these products is that they directly feed the soil microorganisms. The other remarkable quality of these fertilisers is that they contain a full complement of minerals and minors. Ideally, compost based fertilisers should come from a state of the art composting facility to ensure that you get a truly composted fertiliser.

It is essential to avoid the most common mistake in undertaking this type of program. That is becoming a purest. Once started down this path it is easy to fall into this trap. You do not do the environment or your profession any good if you are unemployed. Creating a sustainable, biological turf maintenance program without any pesticides is nearly impossible with the conditions demanded upon by today's golfers. Our turf is simply under too much stress due to low cutting heights to achieve this goal. Reduction of all inputs is the goal not the elimination.

THOMAS R. PARENT SOIL ORGANICS CONSULTING SERVICE E-MAIL tparent@pressenter.com

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Royal Revisits the Past

In 1988 the Royal Melbourne Golf Club began replacing "Suttons mix" greens with Penncross creeping bentgrass. By 1992, all 18 greens on the composite course had been converted. Course Superintendent Jim Porter was less than satisfied with the Penncross citing susceptibility to Poa annua spp invasion, the inability to cope with the stresses of winter and excessive spiking as reasons for his loss of confidence in the grass.

In 1993 the club established a trial to evaluate the performance of Egmont, SR 1020, Cobra, Penncross and the original Suttons which contains a mixture of Colonial, Brown-top and Velvet bentgrasses and a small percentage of Fine Fescue.

All grasses trialed had their pro's and con's but it was the superior density, year round consistency, wear tolerance and relatively low fertility and maintenance requirements that has encouraged the club to commit to

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Environmentally Responsibl

a program of converting all 36 greens to the new Suttons mix at the rate of twelve greens per year.

Jim Porter enlisted the support of Wrightson Seeds to produce the seed under contract. 250 cores were taken from existing greens and became the basis of a breeding program lead by Keith Salisbury at the Kimihia Research Station in Christ Church, New Zealand.

In 1996 the club received 150 grams of the "new" Suttons mix which was established in the nursery and eventually put into a small section of the 16th green on the East Course. A further 2 kg of seed was received in the autumn of 1996 which was used to sow the 12th green East Course in the spring of the same year.

50 kg of seed was received in the autumn of 1998 and the same quantity is expected for following years.

A par 3 "19th hole" has been constructed so that it can be brought into use when any of the par 3's are being rebuilt. Work on the west course started on the 30th of August with holes 1, 3, 4, 5, 12 and 17. Work is scheduled so that either the west or the east course will always have 18 holes in play.

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Chris Crosses to Coopers



Chris Simounds, highly respected Superintendent and turf and irrigation consultant has joined the Coopers Team in South Australia, a division of Chemturf P/L.

Chris said he was pleased to be given an opportunity to join Coopers who are market leaders in the supply of turf management products and services in South Australia.

Chris also added that it was an exciting time for Coopers and he was looking forward to working with John Cooper and Daryl Sellar.

Peter Thomas Mobbs O.A.M. 1925-1999

Peter Thomas Mobbs was born on December 22 1925 in Ballina, New South Wales, the first child of Thomas and Dorothy Mobbs.

He was to be followed by 5 sisters over the next few years and the family moved several times within this period.

The family eventually settled in the Sydney suburb of Boronia Park. Peter did his secondary schooling at the North Sydney Boys High School and at the age of 18 joined the RAAF as a Radar operator spending some time at bases located in Darwin, Moratai and Borneo.

After the war Peter spent many years in a Clerical position at the Department of Motor Transport. Always a keen sportsman, he excelled at Tennis and met his wife Jean at the tennis club and they were married in November 1949 in Sydney. Peter and Jean later become the proud parents to son Jeffrey and daughter Kerrie.

Peter eventually decided a change in career would suit him so he enrolled in and completed the 3 year Horticultural Course at a Sydney Technical College followed by a 1 year course in Greenkeeping

Lawn Bowls at that time was becoming a boom sport in Sydney and a Bowling Greenkeeper was the career choice for Peter, this would change his life and lead to a passion for the turfgrass industry that would last him a lifetime.





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Peter commenced Greenkeeping at the Chatswood West Bowling Club, and after several years at the club left for the position of Head Greenkeeper at the Seaforth Bowling Club where he spent a total of 6 years before arriving at his beloved Denistone Bowling Club which was much closer to home and this club was where Peter spent the next 23 years of his Greenkeeping life up to his retirement at 65 years of age.

Peter was a member of the New South Wales Bowling Greenkeepers Association all of his Greenkeeping life and has held the position of Editor of the magazine – The Bowling Greenkeeper since 1963.

Peter was highly regarded throughout the Turfgrass industry, not just in Bowls circles but across the entire specter that covers turf. On the Bowling Green he was a foundation member of the Putney – Tennyson Bowling Club as well as being a selector and Vice president of that club. He has held membership at the North Ryde RSL Bowling Club since 1958 and has been a National umpire for 15 years. The main interests of Peter Mobbs' life included the garden, bowls, reading, his secretarial duties and family. He was very conscientious and could be relied upon to do everything to the best of his ability.

Peter Mobbs gained perhaps his greatest achievement just last year in September 1998 when awarded the Order of Australia Medal for services to Greenkeeping, a honor bestowed on a great man who was a true member of the brotherhood of Greenkeeping.

The funeral of Peter Mobbs OAM was held at the North Sydney Crematorium on Tuesday August 31 1999 with representatives of the Turfgrass industry from as far as Adelaide present.

Peter Mobbs OAM will be greatly missed and all Greenkeepers should never forget the man who was the Bowling Greenkeepers Association.

Vale – Peter Mobbs OAM 1925 – 1999 By David McGaw - NSWGBA

(Racecourse) Reconstructions

The New South Wales racing industry continues to upgrade country racecourses with works underway at Orange and soon to be commenced at Coffs Harbour. Each of the projects has some new aspects of construction included in the design and more will be revealed in future issues of this magazine.

The works at Orange have involved complete reshaping of the racecourse, the construction of a new, elevated chute for 1000 m starts that is around 350 metres long and will provide a great spectacle for racegoers. The new aspect of this project has been the irrigation system. Designed by Bernard Peasley, it will involve a combination of fixed irrigation for the straight sections of the chutes, and the use of the new Roberts Irriturf boom-type irrigators for the curving parts of the track. This combination will prevent the occurrence of scallops from the fixed sprinklers that bedevil many racecourses.

The Coffs Harbour project has been complex because of the nature of the site. Located just above sea level, there have been a number of hurdles to jump (pardon the pun) in getting the approvals. Firstly, the site is a possible source of Acid Sulphate Soils and the determination of what treatment was necessary required extensive borehole testing. Secondly, the choice to use effluent water required a further series of tests and the adoption of some specific operational procedures. Thirdly, as the site contains wetland components, all site works had to be restored using indigenous species.

But, possibly the most innovative practice on this site will be the means of excavating the borrow pit and spreading that as fill material. This will be done using a dredge and a slurry pump. Just picture a large pipe pushing along a slurry of sand and water to the area where the filling is to occur this is the way that Coffs will be reshaped Not your conventional dozers and scrapers for this job. More on this in following issues.

By Ian Chivers Racing Solutions







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For a demonstration or further details call BHM Machinery (see page 38) or visit Southern Green: www.soilreliever.com





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For further information on Aquaflex Customer Solutions contact Soil Moisture Monitoring Services on (03) 5865 5350. CARRARO DE

New model release.

Antonio Carraro has announced the release on the Australian market of the new model TTR4400 HST reversible multi purpose tractor. The new model replaces the very successful Tigretrac 3800 HST and it provides the same qualities of the previous machine with several improvements in specification and design. The 3 speed hydrostatic transmission will be unchanged, and the "Revguide" turntable reverse control console remains.

The new TTR 4400 will now be fitted with the Yanmar engine type "3TNE 88 CR" which is a direct injected 3 cylinder diesel providing 38 horsepower. As this engine has a larger displacement than the previous engine there is more torque available. The direct injection produces more economical power, with reduced emissions and it also operates at lower temperatures that will improve the tractors performance for out front mowing operations. The 4 wheel steer version of the new model, now has electronic sensing for the steering mode which is constantly self adjusting and changes from one mode to the other with the flick of a switch. The new models will be available in basic ROPS versions; half cabin or fully enclosed air-conditioned cabin. For further details contact Antonio Carraro on: 1800 636 929 – freecall.





state REPORT

President's Pen

Australian Turfgrass Mangement continues to attract corporate support and more subscribers and I am pleased to now report that the magazine has obtained a level of advertising support, which guarantees its long-term viability. In launching ATM just eight months ago, the AGCSA Board budgeted for the magazine to reach this level by June 2000. Achieving the target, nine months ahead of schedule is an indication of the respect the magazine has gained in such a short space of time. Congratulations are extended to the AGCSA staff, particularly Phil George, our Publications Manager, who has juggled the dual responsibilities of editorial and advertising admirably.

In other AGCSA news we have recently conducted the second roving workshop for the year. The latest series of workshops were jointly organised by the AGCSA in conjunction with the Australian Golf Union, the Golf Club Secretary Managers Association, and the Society of Australian Golf Course Architects. Over 200 people attended Australia wide and this will hopefully be the first of many such joint projects. In February the AGCSA will be bringing in Dr. Ali Haravandi from the University of California to tour all states and present workshops on turf water use. From November 25-28th, the AGCSA will be providing Course Quality Officials for the Holden Australian Open, supported by the Toro company. Registration forms for the CQO program will be distributed shortly and I encourage members to nominate their groundstaff or join the program themselves. It's a great way to see the golf and show the general public the correct way to repair divots and rake bunkers.

The AGCSA recently mailed an information sheet to all members regarding proposed changes to the AGCSA Accreditation program and the introduction of the AGCSA Skills Recognition program. At this stage no feedback has been received from members on this vital topic. The AGCSA is planning to introduce the new structures in January 2000, and I would encourage members to review the proposal and respond.

In the previous edition of ATM, readers would have seen the registration form for the upcoming Millennium Turfgrass Conference. I would encourage prospective delegates to book early. Already the trade show is selling rapidly and companies wishing to book space are asked to ring Euan Laird at the AGCSA office on (03) 9886-6200.

The AGCSA has recently added a positions wanted and positions vacant section to the AGCSA Online web site. Persons wishing to advertise on this site should contact the AGCSA office.

I wish all members a smooth transition to their summer turf management programs.

Peter Frewin President, AGCSA



The Queensland Nursery Association and North Queensland Branch of the GCSAQ have once again combined to stage a successful event at Cluden Park racecourse in Townsville.

This years program included presentations from Peter McMaugh, Steve Williams, Scott Taylor, Terry Woodcock and Phil Walsh. Topics included: Alternative Turfgrass Species for the tropics, and insight into the real world of project management,



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Brisbane Ph (07) 3277 3999 Melbourne Ph (03) 9380 8888 Perth Ph (08) 9452 7777 construction maintenance, water conservation and golf course operation. Machinery demonstrations were performed by John Deere and Toro.

Townsville turned on perfect weather for the show, and a successful and enjoyable day was had by all. The Monday night was the highlight of the social calendar with a Dinner Dance held at Townsville RSL.

The 190 guests enjoyed a fantastic seafood buffet. The night also had awards, raffles and prizes going all night. Special thanks go to Vernon Jepson for his presentation and speech on the night for "FNQ Apprentice of the year" award.

The next day commenced with the last speaker and seminars, and at 2.00pm "the John Deere Cup" commenced. Townsville Golf Club was in great condition (well done Andy and crew). The event was won by Rod Cades' team.

Many thanks to our sponsors: Scotts, John Deere, Searles, Toro, McCrackens, Plant-itrite-Spray pack, Yates and Rochedale.

See you all next year.

Paul Earnshaw President, FNQGCSA

With the rain gauge registering over 1400mm far this year we are already over our annual average rainfall with the wet season still to come! The water table is so high that it takes very little rain to cause puddling and run off. We are all hoping for some dry weather for a change!

News in our area is mainly concerned with a certain contracting group that has picked up courses in the southeast that have had management problems of one form or another. While it has long been a problem in Victoria this situation is different in a number of ways. Our Association intends to inform it's members of steps they can take to make themselves more competitive in the marketplace and justify the use of skilled, trained operators with more than just the bottom line figure on a balance sheet at stake in these environmentally conscious times.

Our recent AGM returned a changed committee, President – Jon Penberthy, Vice President – Barry Cox, Secretary – Greg Plummer, Treasurer – Vernon Jepson, Committee men – Rod Cook, Pat Pauli, Paul Bevan and Danny Ryan. This dynamic team is committed to achieving results in the changing education area and in instigating some much needed research in this part of the world. Thanks must go to our out going members, Steve Buttigeig, Glen Dunstan, Andy Date and Wayne Anderson whose efforts have been tremendous. Enough of my ramblings, good luck to you all and have a pleasant spring.

Jon Penberthy President, GCSAQ



Following an unseasonally dry winter in the west, many courses are now busy renovating and preparing for what promises to be another long hot summer.

On Tuesday the 14th September our association held a "spring seminar" at the W.A.C.A. This event was well attended with member's from the Ground's Manager's Association, Bowling Green Keepers and the Secretary Manager's also invited.

The seminar commenced at 10.30am with John Schlafrig from the Water and Rivers Commission discussing current and future licensing procedures, tradable water entitlements, water resource allocation, waste water reuse and irrigation auditing. John's talk was followed by Tony Dodson from Hortus Australia who covered the new national standards for trade qualifications and workplace assessment issues.

After a short break Digby Short from U.W.A updated us on the latest results from the Turf water use research project and on future planned research work on nutrient and irrigation interaction.

Our very popular Super Series golf event's continued to be very successful with Matthew Day of CJD machinery leading the series at this stage.

On October the 19th the Toro Cup event will be played at the pristine Margaret River Golf Course. This event should not be missed and I hope to see as many members as possible supporting these day's.

Rob MacDonald President, GCSAWA





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(NSWGCSA) (VGCSA ·

Late winter provided the majority of New South Wales with reduced rainfall and mild conditions. These conditions provided the courses with Kikuyu some of the best playing surfaces produced during winter (contrary to those who believe Kikuyu is only a weed!)

New South Wales held it's AGM at Pennant Hills Golf Club in late August, with only a few difficult questions from the floor, a great day was had by all. Thanks are extended to Toro for their sponsorship of the day, along with providing an overview of irrigation control system selection, and machinery demonstrations. Martyn Black (Castle Hill Country Club) was a guest speaker on the day, giving an overview of his recent tour of golf courses in Scotland and Ireland. Richard Kirkby (host superintendent) had the course looking a treat for the afternoon golf, with many enjoying late afternoon nine holes in almost summer conditions.

Martyn Black has been notified that he will be hosting the Canon Classic Tournament in February. Castle Hill was the location for the inaugural Canon Tournament several years ago and its return will put the spotlight on the new construction work. Martyn has recently commenced the reconstruction of the final two holes of the Grant, Newton and Spencer master plan. The new layout will certainly test the players and should be a visual delight for all the spectators.

Other construction in progress has been two new greens at Windsor Country Club (Steve Seckold GCS), continued reconstruction at Ryde-Parramatta Golf Club (Geoff Phillips GCS), who are nearing completion of their complete rebuild. Monash Country Club (Marshal Howarth GCS) is rebuilding the majority of their tees, and Mona Vale Golf Club (Scott Armstrong GCS) is commencing a major alteration to their Clubhouse surrounds incorporating several new greens and tees

The next educational day for the Association will be in late October at Bankstown Golf Club.

Mark Parker President, NSWGCSA

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The AGCSA has recently been promoting the importance of Superintendents, within their own club, operating with integrity, maintaining up-to-date technical knowledge, effectively communicating with committees and generally presenting themselves as professional resource managers.

This issue has probably been brought to a head due to clubs interstate now considering alternative management options. In Victoria this has been topical for a number of years and as a Superintendent's Association, the VGCSA has been asked to address this issue by our members. The conclusion we have reached in Victoria, is the only real option for Superintendents is to realise our positions are under scrutiny every day and like any other industry, clubs will be assessing alternative options if they are not satisfied with current arrangements. The best option for Superintendents is to strive to operate under the guidelines of best practice and promote ourselves within our own workplace. The support our Association should be providing is the opportunity for networking among members and provide educational options through seminars, conferences etc.

The VGCSA country meeting in Yarrawonga in August was, from all reports, a good weekend. Numbers were a little disappointing and we apologise for not having the newsletter out earlier. Speakers Ron McCartney (Sports Turf Consultants) and local Superintendents Michael Swanwick (Host Superintendent), Ian Hancock (Jubilee), Andrew Johnson (Rich River) and David Rogers (Corowa) gave excellent presentations. Oasis Turf Supplies sponsored breakfast and golf trophies and we thank them for their involvement. Thankyou to Michael Swanwick and Yarrawonga and Border Golf Club for hosting the meeting.

Our final meeting for 1999 will be held at Geelong Golf Club on Monday December



13. We hope to have former VGCSA member Owen Browne, now Superintendent at the Dukes Course, St. Andrews, as our guest speaker. Owen will give a presentation on construction and maintenance St. Andrews style.

Richard Forsyth President, VGCSA



Winter has been very dry this year with rainfall down by about 200ml. Unless we get some spring rain we will be in for some very trying times.

The 4th National Turfgrass Seminar in Perth was well attended with Walter Woods being the highlight. For those of us who were able to have holidays at the same time WA is a great place.

On 25th August Cooper's and Chemturf held their turf seminar, which again was very well attended, and the next day a workshop on Poa control was held. Those attending all participated and a great deal of information and experiences was shared.

Our next field day will be held at North Lakes GC with Simon Foord our host superintendent and Murtfarm Pty Ltd as sponsors.

Coming events:

28th October 5th Decembe

March

Mount Baker Picnic Day at Belair National Park Flagstaff Hill

Bob Dellow President, SAGCSA



The Launceston Country Club Casino was the venue for the AGM on 18th August. It was pleasing to see quite a few new faces, and attendance was up on previous years. A couple of changes have been made to the board this year 1999-2000 with the following positions being filled:

President Vice President Secretary Treasurer Committee Phil Hill Steve Harris Shane Knott Danny Gilligan Chris Hay, Steve Lewis, Stuart Mathewson, Harry Skledar Many thanks must go to the previous committee, in particular outgoing President Mark Potter for his efforts over the last two years.

The success of the AGM must not go without thanking the Toro Company for once again sponsoring the day. A generous display of Toro machinery was freighted over Bass Straight for all our members to see. A presentation on each machine was well received by all members.

It was amazing to find the huge contrast in climatic conditions between Hobart and Launceston over the winter period. The southerners have been irrigating well into August, which is almost unheard of. However, in the north of the State consistent rainfall over the last three months has already last years rainfall to date by over 120mm. (Currently 536mm to 31st August compared to 350mm in the south). With the fairly mild temperature, this has made disease control difficult.

The Legend couchgrass trials in Hobart have revealed a somewhat negative response to our trying conditions down under. Poa annua invasion was quite extensive due to the long dormancy period, and the winter colour of the Legend, was not as favorable as we hoped.

This result has not dampened our spirits and more trials on other couchgrass species is under close scrutiny.

A projected format for field days and seminars will be decided at our next committee meeting and published in the next edition of ATM.

Member support will be emphasised over the next twelve months. It is critical that we attend seminars and field days and get back on the map for all roving seminars and other educational opportunities. Until this happens all superintendents on the AGCSA accreditation program risk jeopardizing their recognition.

Phil Hill President, TGCSA

At our AGM on the 5th August we recognized the 10th anniversary of the TGAA (Vic) and looked back and see how rewarding it has been for all involved.

Over the past year the Association has embarked on a number of successful ventures. These include:

 Established of the TGAA Website which provides members with up to date information and the ability to communicate and research turf related topics. 3800 hits so far justifies our launch on the information super highway. • Another form of exposure that has added benefit to our members is the new Australian Turfgrass Management magazine. After much discussion your Committee decided to support this magazine by adding a report to each edition.

Our activities this year included the Jells Park Tour, Sportsgrass and Passive Turf Seminar, Xmas Break-Up, 'Superbox' Football Night, AUSTEP Trial Introduction, Bursars Field Day and the Turf Trade Fair.

Having reflected on our aims and objectives the committee felt that these activities more than adequately achieved our goals. They provided a forum to promote friendship and solidarity between those involved in the Turfgrass industry.

On a personal note I would like to say it has been an honour to represent you and hope I have fulfilled your expectations. The Committee this past year has been tireless in their efforts and I thank them very much for their commitment and guidance.

To Simone Staples our administrations Officer, thank you for your dedication in co-ordinating our activities. She has been an enormous contributor to our continued success.

To our sponsors who are so important and support us each year, thank you for being part of our Association and hope our partnership continues to flourish. The future of the TGAA looks to be fruitful especially in the New Year with the forthcoming Millennium Conference.

I would like to thank Bruce Stephens and Ashley Miller who have decided to stand down from the Committee. As Vice Presidents for the past few years they have lead from the front and as committeemen from inception can feel proud of all their achievements.

Hope the renovations are going well and that Spring is being kind to your surfaces.

Robert Savedra President, TGAA (Vic),



The 8th AGM of the Association was held on the 24th August at the Ainslie Football Club with 38 members and sponsors attending.

President Pat welcomed everybody, then announced that he would not be seeking reelection. Pat thanked the committee for all their hard work over the previous 12 months, especially those involved in organising the mid-year irrigation seminar. Pat had also thanked our sponsors for their ongoing support, which without the Association would struggle.





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Pat went on to thank Steven Heskett for his work in organising a study award for CIT students. Steven was presented with the president's award and congratulated on winning the AGCSA Graduate award presented during the conference in Perth.

The following people were elected unopposed

Bruce Davies – President Paul Janssens – Secretary Wade Turner – Treasurer Grant King – Assistant Treasurer

Committee members are Norm Dunn, Keith McIntire, Michael Borowki, Dave Percell, Justin Haslam, Steve Heskett, Gary Dawson and Anthony Brassil.

Things are gearing up for spring with turf managers throughout the district having completed or well into renovations. With new legislation concerning catchment water used for irrigation hitting the region, let's hope it will be a more forgiving summer than previously experienced.

Moving into the 21st century, sources of information for the turf manager are ever increasing and one of the most valuable supplies is the World Wide Web. Just recently completed is an updated listing of relevant sites. If you wish to obtain a copy, send an e-mail to either bruce.davis@cit.act.edu.au or pat.garratt@gg.gov.au. Here's a few that may tickle your fancy: TGAA site www.tra.asn.au Turf West www.turfwest.com.au Sydney Cricket Ground www.scgt.oz.au/turfgrass.html.

'Til next time agrostologists'

Justin A K Haslam Committee, TGAA & Surrounding Region



Following the AGM we are pleased to announce that both Peter Barron and Duncan Knox have been retained as president and secretary. We have also inducted 3 new life members. They are: Ian Latham, Len McKenzie and Ray Thorne, all of whom are still very active in the trade.

Ian left Melbourne 2 years ago and is now enjoying life and greenkeeping in Ocean Grove. Len is tending the greens at the Victoria Bowls Club in Ballarat and remains are regular attendee at VGA events. Ray is in semi retirement but stays in touch with the industry by representing Golf & Bowls Machinery in Melton.

The VGA opening Day will be our first function for the season and will be held at the Maribynong Park Bowls Club on Thursday 21st of October. There will be a guest speaker, BBQ lunch and refreshments. It is important that all members attend as awards from last season will also be presented and it is important that these awards receive the support they deserve.

Toby Lumsden Vice President, VGA

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