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Turfgrass
MANAGEMENT

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Windsor Country Golf Club is located on the fringes of Sydney. Featuring rich alluvial soils, and plentiful water allocation from the Hawkesbury River, the ex-dairy land with the abundance of these natural resources sustains a sward of natural couch.

Windsor Country Golf Club had its humble beginnings in the early 1960's when a group of local golf enthusiasts, frustrated with being denied access to Sydney golf courses, decided to investigate the feasibility of building their own. A town meeting led to a working committee, and then the procurement of land on the fringe of town.

In less than a year, 9 holes were playable. This in itself was an amazing feat, apparently due to the retention of Vince Church as the construction supervisor. While Vince states that those original greens were designed to last for 10 years, 10 of the original 18 greens are still in use today, some 40 years later, a testament to his skills.

Stephen Seckold, Course Superintendent and his team do have a number of challenges. Their current irrigation system is manual, and unable to deliver the necessary water requirements. Plans are now afoot for this to be rectified in the future. The course is prone to flooding, and they have greens which have more than reached their use-by date. While there isn't much they can do about the flooding, they have made remarkable progress in the replacement of the greens.

Due to its location on the outskirts of Sydney, membership subscriptions are not large enough to allow for a substantial amount of capital towards course upgrading, and maintenance equipment. Stephen's role has therefore been to ensure the maximum return for any capital outlay. According to Stephen, he has achieved this through a number of ways:

"All construction works have been carried out in-house, allowing for the rebuilding of 8 greens at minimal cost. While this has been a major challenge for myself and the team, it is also rewarding to see the finished product, while still having enough capital expenditure budget left to spend on the equipment necessary to maintain the course. The use of John Deere has been the other source of return maximisation, and I believe has also extended the life of the playing surfaces. The exceptional value for money, along with the outstanding service and spare parts back-up from my local John Deere dealer, Cess Hill Industries, has impressed the club, and myself over the many years of our association."

John Deere's partnership with Windsor Country Golf Club began before Stephen's time with a purchase of a single unit 12 years ago. Since that time John Deere, and the local dealer Cess Hill Industries have worked closely with Stephen and the Windsor Country Golf club to achieve a common goal - to transform a first class golf course layout to a first class golf course. The results were evident with the course being granted the 1998 NSW State Championship of Champions event.

John Deere would like to thank Stephen Seckold and his maintenance team for their ongoing commitment and dedication to the quality of the Windsor Country Golf Club.

Stephen Seckold, Course Superintendent

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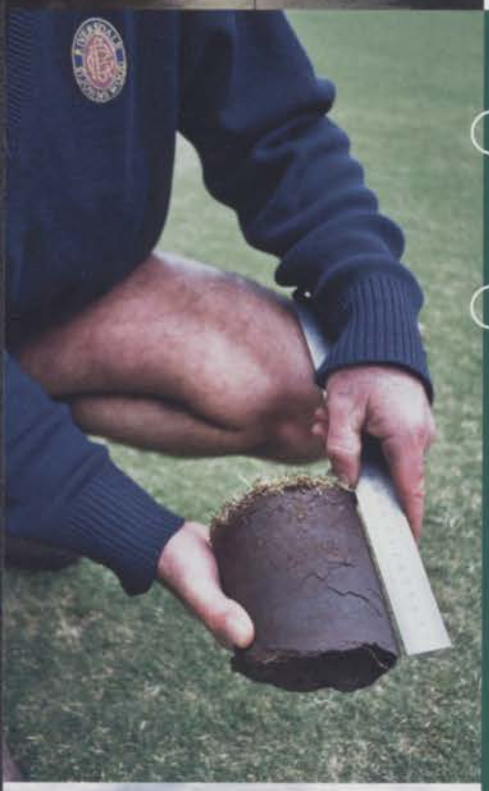

cover

Royal Queensland Golf Club, venue of the 2002 AGCSA Golf Championships, proudly supported by Toro Australia

special features

Water Budget – Design and Implementation 8

Surely every turf manager understands the importance of using water efficiently? However, implementing a strategy to achieve efficiency is where it gets hard. In this the first in a two part series, Kevin Handrek, well-known horticultural author and consultant presents a method that makes too much sense to ignore.

Dalat – A Palace in the Mountains 12

Nestled 1500m above sea level in the Lang Bian Highlands of Central Vietnam, 320 kilometers northeast of Ho Chi Minh City is Dalat, home to much more than the countries finest golf course.

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Local water authorities have set some pretty ambitious targets as far as effluent water use is concerned. Leading Turf Consultant John Neylan discusses the issues as they relate to use on turf.

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Subsurface Drainage of Modern Putting Greens 16

Researchers Guy Prettyman and Ed McCoy from The Ohio State University provide in-depth analysis of the drainage characteristics of USGA and California Method greens profiles.

Golf Course Superintendent

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Conference Special

Welcome to Brisbane for the 18th Annual Turfgrass Conference and Trade Show.
This Conference promises to be special with a great line up of presentations from a host of international speakers and a healthy compliment of 'workshops' that allow you to tailor your learning like never before.

The trade is here in force so expect to see the latest in turf management equipment, products and services.

Once again, Australian Turfgrass Management (ATM) magazine will serve as the 'official guide' of the show and inside you will find a complete conference program, list of exhibitors and the Trade Show floor plan.

But that's not all! Also in this edition well-known author and consultant Kevin Handrek presents a practical way to construct a water budget and we visit the Dalat Palace Golf Club, rated by Golf Digest as Vietnams best.

In RESEARCH Ed McCoy and Guy Prettyman from Ohio State University examine the drainage characteristics of USGA and California Method of greens constructions and The AGCSA's John Neylan discusses the management considerations associated with using effluent water on turf.

If you can make it to the Conference, have a great week and I look forward to seeing you there, to all our other readers, I hope you enjoy the June edition of ATM.

Regards,

Phil George
Editor

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This edition of the ATM follows closely on the heels of Vol. 4.2 and is predominantly focussing on the 18th Australian Turfgrass Conference to be held in Brisbane, Queensland from June 17 – 21, 2002. By bringing the magazine out a little earlier the AGCSA hopes that this will give people the time to study the format of the Conference and Trade Show in particular, so as to formulate a "plan of attack for the week". I certainly hope that people have pencilled in at least one day to come along and if nothing else be able to get along to the Trade Show. The educational side of the conference is certainly worth attending and preliminary numbers to some of the workshops may even preclude late registrations from attendance (don't forget it's first in best dressed), so if you have not registered take the time to get one in so as not to miss out.

For clubs in South East Queensland I would like to mention the joint QGU and AGCSA workshop that is open to Club Management and Green's Committee members. This is certainly a day that is a must for those representatives of the club to attend as it will give information that is quite relevant to their respective positions within their Club's infrastructure. More importantly it will bring them up to date on issues that are at the forefront of many clubs. Issues such as environmental impacts of golf course operations, noise pollution to mention just a couple, will certainly help Superintendents reinforce the messages that may have been lost at the Committee table. Days like this also give people the opportunity to witness first hand the professional manner and commitment of the educational role of the Superintendent.

The conference also gives AGCSA members the opportunity to attend the AGM and voice any concerns that they may have relevant to the Association. At the time of writing, nominations for Board positions were still open. As President for the last year I can honestly say that I have enjoyed my term and I hope to continue to serve the AGCSA members. Time will tell.

The workshop series just completed by the AGCSA, in conjunction with Horticulture Australia, has been a well received and informative series. Dr. Jim Moore from the USGA was most appreciative of the feed back received from attendees and despite the world wind nature of his trip he certainly enjoyed the workshop series. Although, I must admit the "pulling of teeth session" had some people cringing after the lunch break.

I look forward to catching up with everyone at the conference and I certainly hope that everyone enjoys the magazine.

Mark K. Couchman
President, AGCSA

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Water Budgeting: A Practical Method

Part One: Soil Reservoir Size

You, dear reader, will almost certainly have been irrigating turf for many years. You know that you have been successful, otherwise you would not still have your job. What, you may be thinking, can there be that is new or different in the simple matter of irrigating turf?

Judging by the response when I recently presented this information to members of the VGCSA, I am sure that you will find much here that will help you get the most from the water your irrigation systems deliver to the turf you manage.

This, the first of two articles provides a picture of water in soils. The second article will focus on climatic conditions and water use by plants.

Water budget basics

The water budget procedure is a method for supplying turf (or any other plants) with water at intervals and in amounts that produce optimum growth for the particular use.
The method may be modified to minimise water use where water is in short supply, or to minimise the adverse effects of poor quality water.

The basic components are:

- The soil is a water reservoir.
  We need to know its size. (this article)
- Air sucks water from soil and turf.
  How fast does this happen? (next article)
- How much of the reservoir can be lost before we must refill it? (this article)
- How much water must be applied? (next article)

Reservoir size

The amount of water that can be held in a dam increases with increases in retaining wall height and area flooded. With turf, we can ignore area, because on average each plant only has access to the water immediately below it. But what about depth? Obviously, reservoir size increases as rooting depth increases, but it is more complicated than that. In dams, the water is not 'diluted' with air or solids.
The stuff in the dam is essentially 100% water. In soils, the water sits amongst soil particles and

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plant roots, and there are also pockets of air. In a cubic metre of water, there will be 1000 litres of water, but in a cubic metre of soil, the amount of water will generally be somewhere in the range 100 to 500 litres.

These numbers can be written in a more useful way, using the information that:

One litre of water spread over one square metre will have a depth of one mm, and

One cubic metre of soil will have a depth of one metre under a surface area of one square metre.

Therefore, saying that a soil contains 100 to 500 litres of water per cubic metre is the same as saying that each metre (1000 mm) depth contains 100 to 500 mm depth of water or, more usefully, each centimetre (10 mm) contains 1 to 5 mm of water. This way of putting it makes it easy to compare soil water with rainfall or irrigation water, which is measured in mm (depth).

So if you know that the roots of a particular area of turf penetrate a soil to a depth of 20 cm, you will know that the amount of water that can be contacted by that turf is 20 x (1 to 5) = 20 to 100 mm (depth) of water.

The range 20 to 100 mm is very wide. How do we find the figure for a particular soil? To estimate that, we need to divert for a while to a consideration of how water and soil particles interact.

Water and soil particles

Water is attracted to the surfaces of soil particles (well, most of them – not the water-repellent ones). If this were not so, water falling onto a soil surface would either simply run straight through the soil or would run across its surface. It is attraction between soil particle surfaces and water that holds water in the soil against the pull of gravity.
The larger the surface area of the particles in a soil, the greater will be the forces of attraction between them and water.
That means that fine-textured soils (clays, loams) hold more water than do coarse-textured soils (sands). So as a first step in estimating reservoir size, we conclude that the finer the texture of the soil, the larger will be the reservoir of total water than it can hold (see Table 1). The figures in this and later tables are from *Growing Media for Ornamental Plants and Turf* (Handreck and Black, U NSW Press, 3rd ed, 2002. Refer to AGCSA Bookshop).

Having a rough idea of the texture of a soil gives you a rough figure for the size of its reservoir.

Oh that life were that simple! Several things complicate this simple picture.

Table 1. Approximate total amounts of water held by soils of different texture.

Soil texture	Approximate amount of total water held (mm/cm)
Sand	1
Loamy sand	1.5
Sandy loam	2.5
Sandy loam plus organic matter	3
Loam	3.5
Clay	4-5

Available reservoir size

Some of the reservoir is held so tightly by the soil particles that it cannot be extracted by plant roots; it is not available to them. Table 2 gives some rough figures for the amounts of soil water that are potentially available to plants.

Table 2. Approximate amounts of available water held by soils of different texture.

Soil texture	Approximate amount of available water held (mm/cm)
Sand	0.7
Loamy sand	1
Sandy loam	1.5
Sandy loam plus organic matter	1.9
Loam	2.2
Clay	1.4-2*

* The many very tiny pores in clay soils hold water so tightly that plants are unable to use it.

Readily available reservoir size

The next complications have to do with the interaction between plant roots and soil water. I discuss the detail of water loss from plants in the next article. Here I want to focus on the movement of water to plant roots.

Soon after rain or irrigation, when a soil holds its maximum amount of water, the films of water around soil particles are thick. As a root takes up water from a particular spot, water can easily flow to that spot from elsewhere. But as more and more water is removed from the soil, the films of water become thinner. Just as friction losses in water pipes increase rapidly as pipe diameter decreases, so flow through thin water films is much slower than through thick water films in soils.

So, as the amount of water in a soil decreases, the remaining water becomes more slowly available to plant roots. When plant needs are high, as during a hot afternoon, the rate of supply to its roots may not be able to keep up with needs, so the plant will start to wilt. This wilting immediately decreases its growth rate. Mild wilting is quickly overcome during the next night, when transpiration losses are much lower and even the slow flow of water to roots is sufficiently fast to 'fill ' the plant again.

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Table 3. Amounts of readily available water held by soils of different textures

Soil texture	Readily available water for lush turf growth (mm/cm)	Readily available water for moderate growth of acceptable quality (mm/cm)	Readily available water for just acceptable turf growth and quality (mm/cm)
Sand	0.3	0.5	0.6
Loamy sand	0.4	0.7	0.8
Sandy loam	0.6	1.1	1.2
Sandy loam plus organic matter	0.8	1.4	1.5
Loam	0.9	1.7	1.8
Clay	0.5-1.1	1.0-1.3	1.1-1.6

Note: The numbers in the second column are smaller than those in the last two columns because for lush growth the turf must never be under water stress. Therefore only a small proportion of the water in the soil can be used before more must be applied.

Measuring root depth

If extra water is not applied, the periods of wilting become longer and the wilting more severe. This process continues until all of the plant-available water is used up. Plant growth stops; damage cannot be repaired. With turf, quality deteriorates.

So if turf quality is to be maintained, water must be applied to it before all of the available soil reservoir is used. Table 3 offers some guidelines.

Most turf managers will opt for a reservoir size that is somewhere about the central column of data. The turf is not to be very lush, but neither is it to be of barely acceptable quality.

How to measure readily available reservoir size

If Table 3 is a bit rough for you, you can measure the size of the readily available reservoir in your soil as follows.

- Irrigate the turf.
- Between 12 and 24 hours later (when

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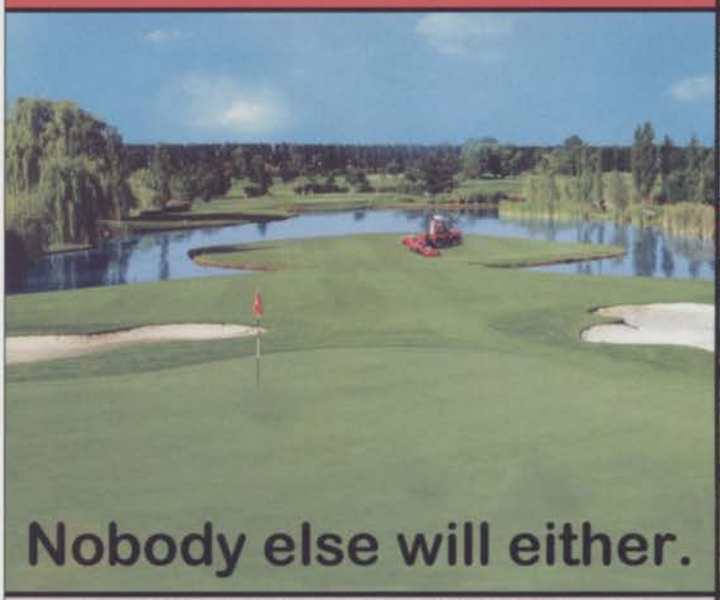

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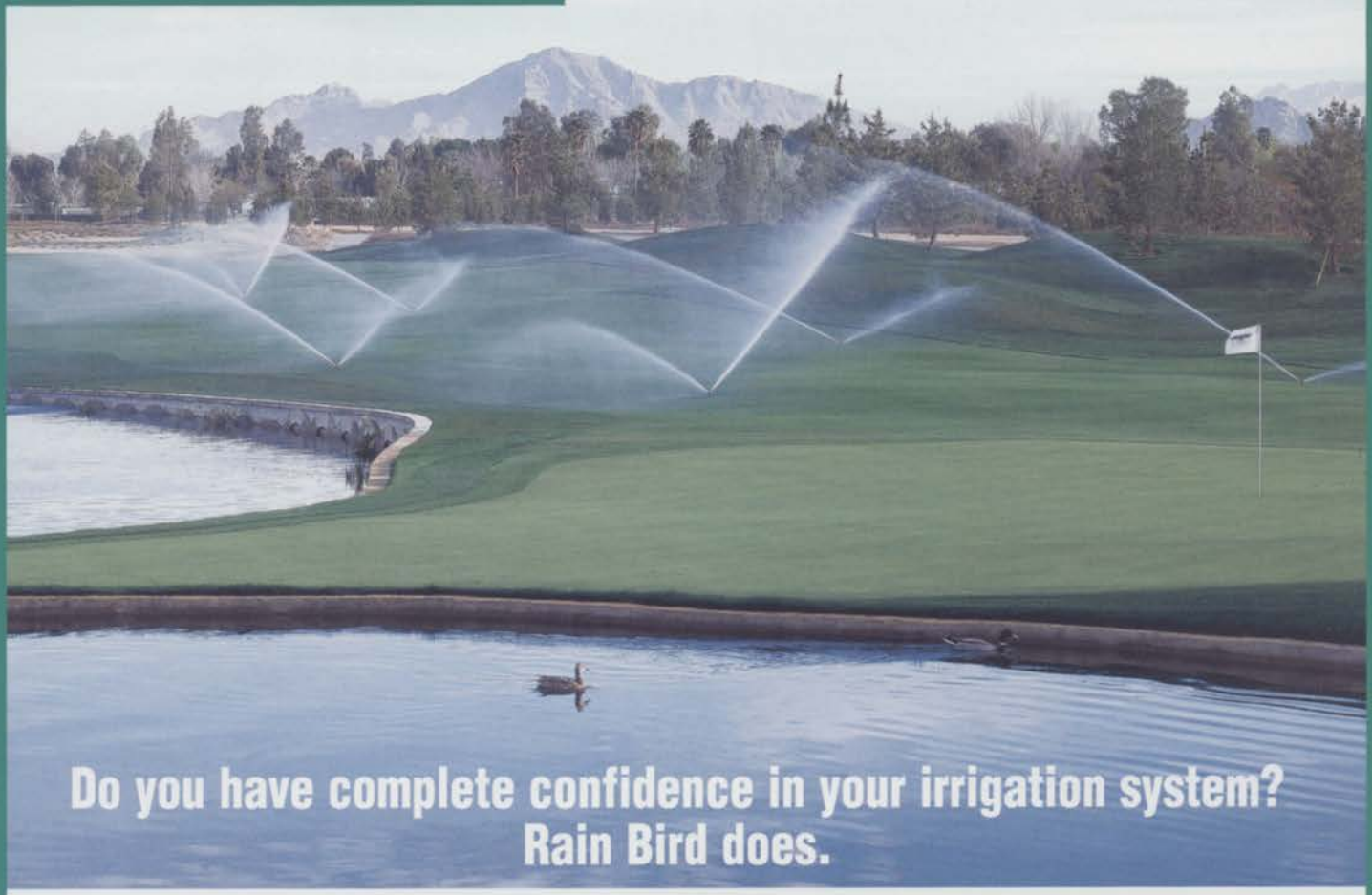

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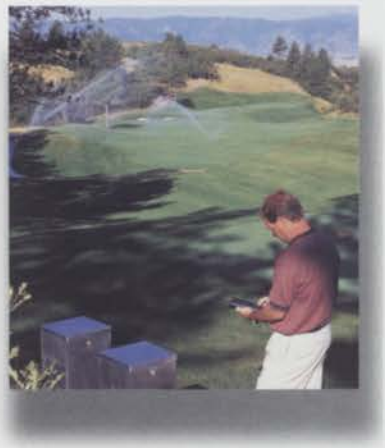

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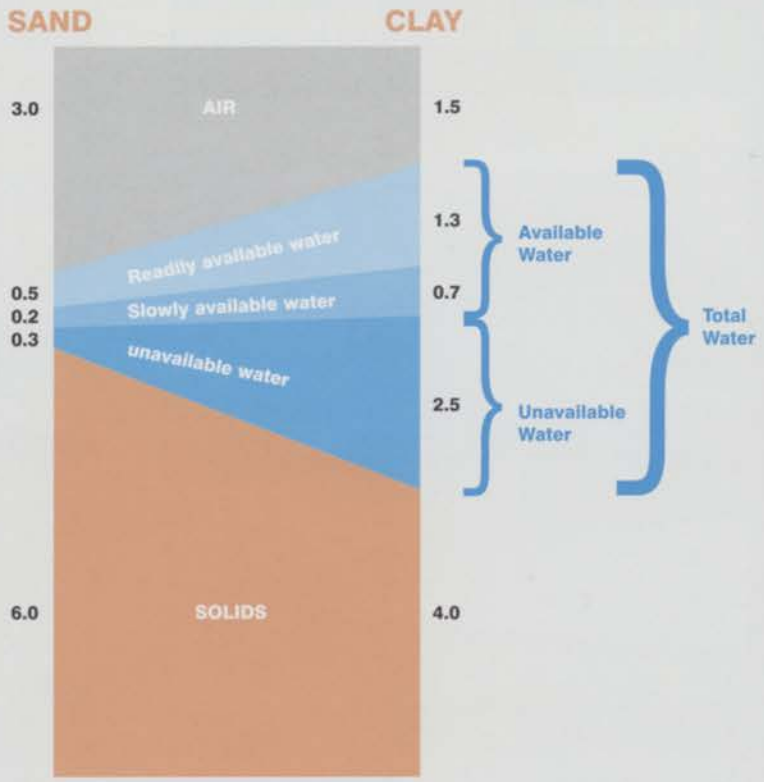

Figure 1: Proportion of water held at field capacity in different soil types

the soil should have drained to field capacity), use a cup cutter to extract a core of soil to the rooting depth you have chosen for this area (see below).

- Wrap plastic sheeting around the core, so that no water can be lost through its sides.
- Weigh it.
- Place the core in such a position that the turf is in the sun but the soil is protected from direct sun (even back into the hole if you can get it to fit).
- Weigh the core every several hours during the next few days. Note the condition of the turf at each weighing.
- Continue the weighing until the turf wilts during the hottest part of the day.
- The size of the reservoir is indicated by the difference between the initial core weight and that of its weight about two weighings before the turf showed obvious wilting.
- Calculate reservoir size as in the following example:

Surface area of core = 3.142 x diameter/2 x diameter/2(e.g. 3.142 x 10/2 x 10/2 = 78.6 square centimetres = 0.00786 m^2)

Initial weight = 3.360 kg

Weight 2: weighings before wilting = 3.250 kg.

Therefore water lost 0.110 kg = 0.110 L

Depth of water lost = 0.110/0.00786 = 14 mm (1 L spread over 1 m^2 gives a depth of 1 mm) Hence the readily available reservoir size is 14 mm, (or 14/20 = 0.7 mm/cm)

Perched water table effects

Many golf greens are now established using a USGA type of construction. The gravel 'drainage' layer of this construction not only allows rapid removal of excess water that has flowed through the sandy root zone. It also increases the amount of water held in the root zone through the creation of a perched water table in the root zone immediately above the gravel. This in turn creates a capillary fringe of increased water content in the sand above.

USGA root zones have a loamy sand texture. The perched water table allows their effective reservoir size to be increased from the approximate 0.7 mm/cm (Table 3) to something like 1.4 mm/cm, so long as the turf's roots penetrate deeply enough to access this water.

Rooting depth

Some of the roots of some turf plants can grow to depths of more than one metre into soils with good structures. The roots of others, such as *Poa annua* never grow beyond 15 cm. With all plants, the greatest concentration of roots is in the top 30 cm or so of the root zone. What should you use as the depth of the rootzone?

You can either choose some arbitrary figure such as 20 or 30 cm (or 5 cm if you have to use *P. annua*), or you can determine by core sampling the depth to which the main feeder roots penetrate.

My recommendation is that you should always base your choice on core samples. You can then choose a depth that is realistic for that particular area of turf.

Putting it all together

You have a figure for the amount of readily available water in your soil and another for the depth of the root zone. The total amount of water that can be removed by the turf before you must irrigate is obtained by multiplying them together.

For example, suppose your soil is a loamy sand and you want the turf to be moderately vigorous. From Table 3, the readily available water content will be about 0.7 mm/cm depth. You choose a root zone depth of 25 cm, so the reservoir size is 0.7 x 25 = 17.5 mm.

This means that you must irrigate when the turf has used 17.5 mm of water.

The next article will help you to determine when the turf has lost this amount of water, and therefore when to irrigate.

Kevin Handreck is a world renound author on horticultural topics and is the Managing Director, Netherwood Horticultural Consultants Pty Ltd, Adelaide

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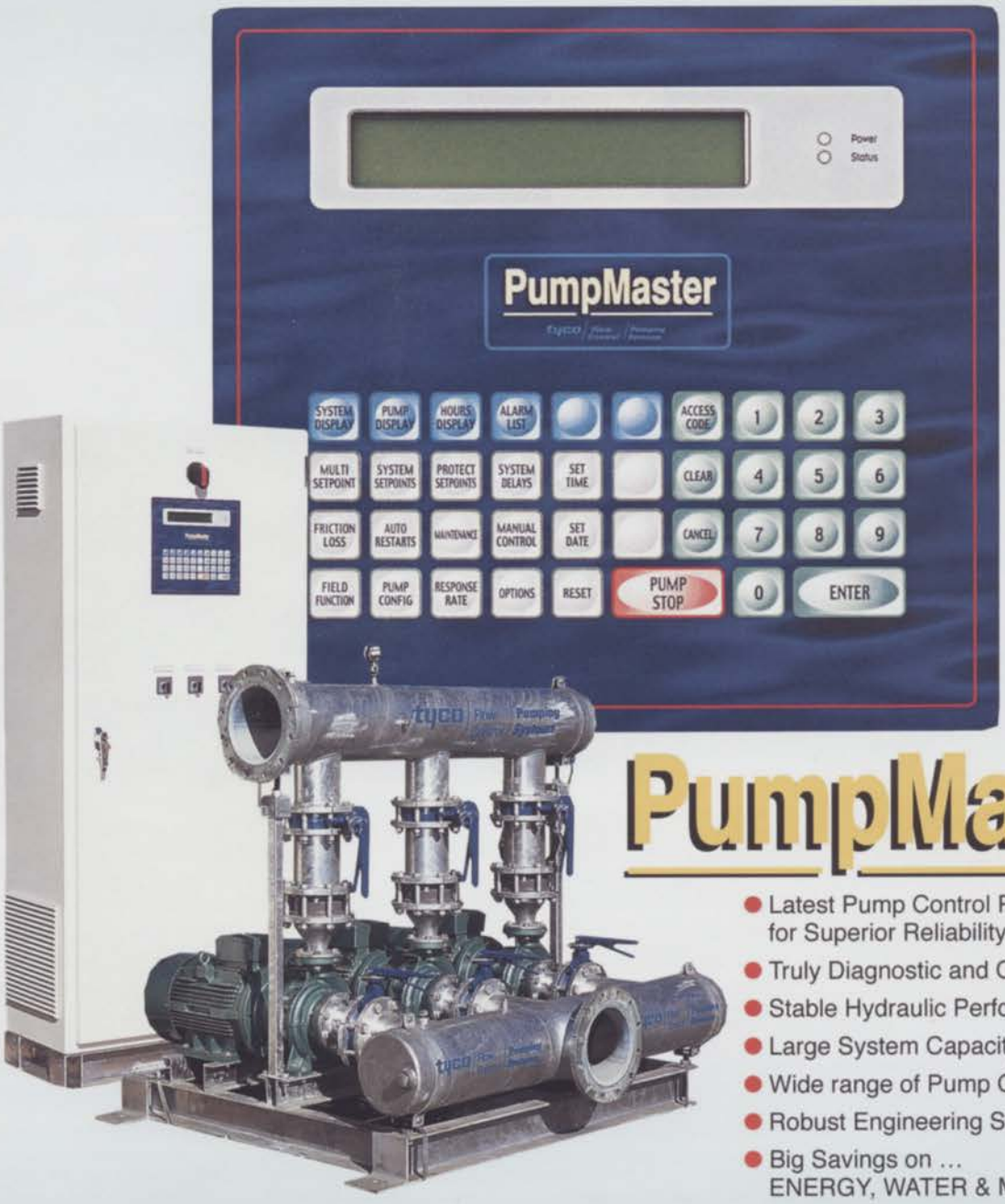

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DALAT – A Palace in the Mountains

photo inset: Superintendent Nong Ngoc Anh (front left) with some of the ground staff

The image that most people have of Vietnam (myself included, before I went there) is of a country at war with the West in a conflict that ended almost 25 years ago.

Certainly there are constant reminders of that terrible time but Vietnam is a proud country with a rich tradition and an astonishing blend of culture and architecture. The food is awesome, people are friendly and the streets are ruled by Honda.

Mention that you have been visiting golf courses in Vietnam and people look at you with an expression of bewilderment, then reel off a series of gags relating to "the smell of naepalm in the morning" and unexploded ordinance.

However, nestled 1500m above sea level in the Lang Bian Highlands of Central Vietnam, 320 kilometers northeast of Ho Chi Minh City is Dalat, a city with a distinctly European feel that has long been a retreat for the ruling class and French colonialists seeking respite from the sweltering 'closeness' of the coastal plains and Mekong Delta.

Perched above the Xuan Huong Lake in the cities heart is the Dalat Palace Golf Club. Now a challenging 18-hole layout of 7,009 yards, the original 8-hole course was built in 1922 as the private retreat for the countries last emporer, Bao Dai who ruled from 1926 to 1945.

Following Emporer Bao Dai's abdication in 1945, the course was abandoned and it wasn't long before the fairways and greens surrendered themselves to the fertile soils of this mountain oasis. Fifteen years later, Dr. Dao Huy Hach, avid golfer and a practicing physician who still resides in Dalat, recognized that the cool climate of Dalat made it an ideal place to

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pursue golf so with the help of friends from the Saigon Golf Club he began the laborious task of rediscovery and restoration.

Aerial photographs from the National Geography Institution and a caddie from the original course were used to re-chart the course and using hand mowers to re-sculpt the fairways, the first hole was revived in 1959 and another followed soon after. These holes were used for practice until the full nine was completed in 1965. It is interesting to note that these new holes had sand/oil greens.

Drawing on assistance from the Saigon Golf Club, services from Dalat Golf Club members and support from the USGA for the clubs second nine, restoration and construction continued for nearly 15 years and throughout the 1960's the club had about 40 members (most from embassy staffs and foreign construction companies in the area) each paying 600 VND [Vietnamese Dong (about 8 cents)] / month.

Following the fall of Saigon and the return of communism, the course was left to grow over once again from 1975 until 1993 when a joint venture project between Danao International Holdings Ltd (US based) and Lam Dong Province resulted in the renovation of the first nine holes once again and the completion of the second nine. The course was christened Dalat Pine Lake Golf Club in 1993, then became the Dalat Palace Golf Club in 1995.

Dalat Palace is rated by Golf Digest as the number one golf course in Vietnam

Rated by *Golf Digest* as the number one golf course in Vietnam, Dalat Palace is managed by Jeff Puchalski, PGA of America member and former professional from the Wilshire Country Club in Los Angeles, who also manages Vietnam's only true resort course, Ocean Dunes (located four hours from Ho Chi Min City in the seaside town of Phan Thiet).

Jeff arrived at Dalat early in 1996 and admits to taking a 'crash course' in agronomy as the entirely bentgrass course (Dalat is the only golf course in SE Asia with bentgrass greens) introduced Palspalum sp into the fairways, colars and tees. The move to Paspalum was motivated by a continual struggle with weeds that were thriving on the copious volumes of water required

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Golf Course Superintendent, Nong Ngoc Anh

to keep the bentgrass alive and Course Superintendent Nong Ngoc Anh was unable to offer much resistance with the limited range of herbicides at his disposal.

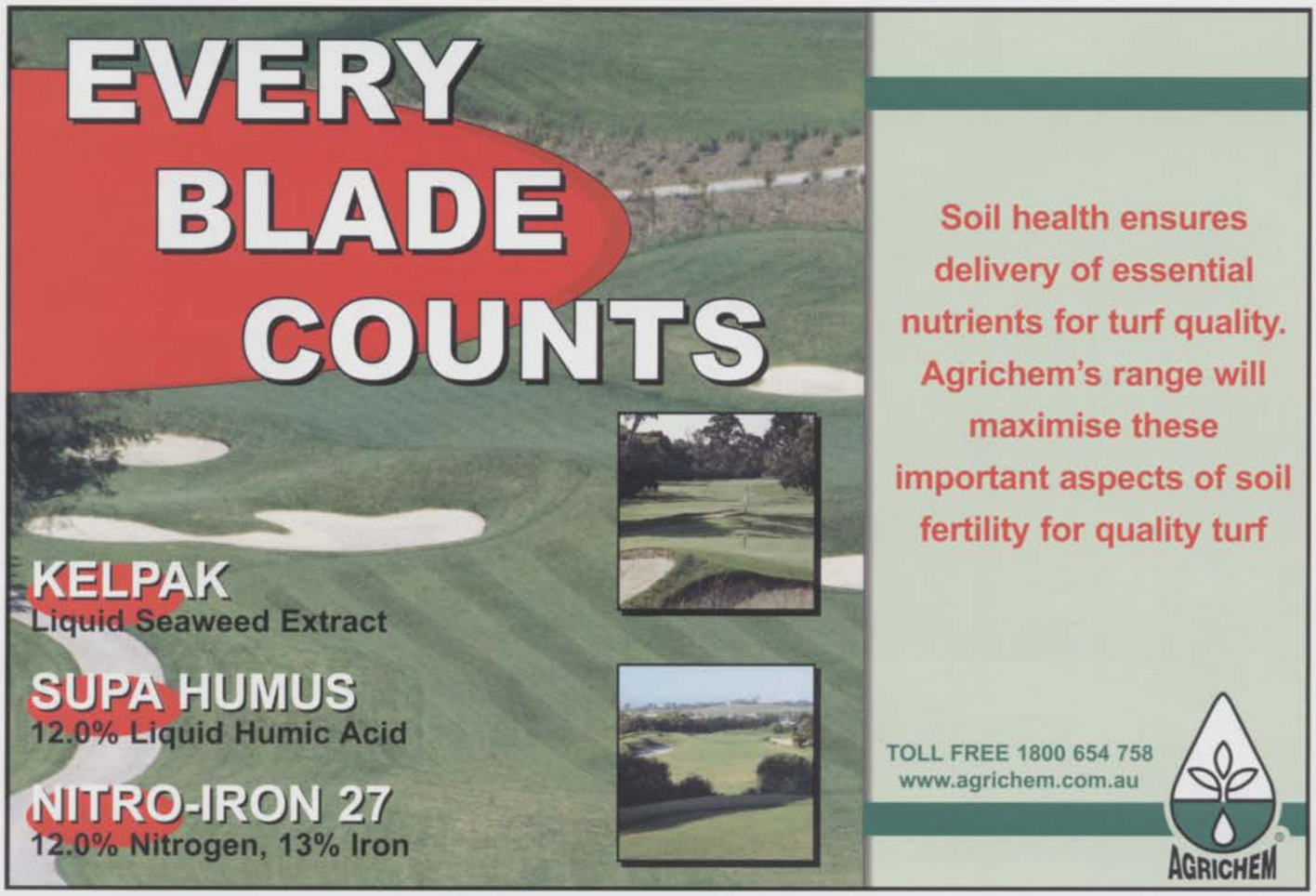
Nong Ngoc Anh is an educated man and native of Dalat who has one daughter and two son's, one of whom is studying IT at University in Ho Chi Minh City. Nong' has a staff of approximately fifty that includes 3 technicians to run and maintain the Rain Bird irrigation system, 6 mechanics who tend the impressive fleet of mostly Jacobsen machinery, 3 spray technicians and a team of ten dedicated to mowing.

Penncross greens are mown daily at a height of 3.3 mm, are feed with a foliar fertiliser every two weeks and are renovated at intervals of 2 to 3 months.

Although by most measures, the staffing levels are high, the course follows 'lean and mean' fertiliser and chemical budgets and virtually all accessories such as tee markers, bunker rakes, bins, cups and flags are handmade by the staff. Said Jeff Puchalski, "although demand for golf here is growing all the time, it is early days for us so we need to be smart, creative and resourceful when it comes to course management".

At this stage, the success of Dalat Palace and other courses in Vietnam is reliant on tourism, which can be incredibly volatile but, Jeff is looking for some 'organic' growth to really help the game establish. And it is coming, the number of Vietnamese members at golf clubs in Vietnam has grown from 70 to 500 in just 3 years and Jeff can see that support for junior golf is not too far away.

Vietnam is an amazing country and although you probably wouldn't travel there just to play golf, it would be a shame to miss Dalat.



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Subsurface Drainage of Modern Putting Greens

There's a lot going on below the surface.

The research greens are constructed within 1.2 by 7.3 meter wooden boxes. The support legs are blocked for slope adjustment, rain simulators are located overhead, and tipping bucket rain gauges are attached to the drainage outflow lines to allow for the measurement of water output.

Subsurface drainage involves both intensity and capacity attributes. Intensity of subsurface drainage refers to how rapidly a root zone drains. Capacity, on the other hand, refers to the extent of excess (gravitational) water removal from the root zone. Consequently, discussions of putting green drainage often become confused since the expression *improved drainage* can imply improved drainage intensity, improved drainage capacity, or both. This confusion most often occurs with modern, high sand content, greens where subsurface drainage performance is emphasized.

The two most prevalent, modern putting green construction methods in the U.S. are the California Method (Davis et al., 1990) and the U.S. Golf Association (U.S.Golf Association Green Section Staff, 1993) green construction technique. The principal differences between these two construction methods are a higher recommended root zone permeability in a California (CA) green and the presence of a gravel blanket in a U.S. Golf Association (USGA) green. With all other factors being equal, a higher root zone permeability should lead to greater drainage rates, and for most sandy root zones, a drier soil profile. Correspondingly, the gravel blanket should help drainage water move rapidly to drain pipes, but it also is shown to increase water retention in the root zone (reviewed by Hummel, 1993; Taylor, 1993). The key to comparing subsurface drainage in CA and USGA greens is understanding the interaction between root zone permeability and the presence of a gravel blanket.

Also, the natural contours or slopes that exist on putting greens may influence both the intensity and capacity of subsurface drainage. Even though these slopes are typically slight, they do represent a driving force for lateral, downslope water movement within the greens profile. The supposition here is that soil water retained in the profile after initial drainage may migrate downslope to yield spatially non-uniform soil moistures across a green. To our knowledge, however, no previously reported research on greens drainage has examined green slope effects.

This article reports research findings to address modern putting green drainage issues. We employed a 2-tier soil profile consisting of root zone overlying gravel to represent the soil profile of a USGA green. The soil profile of a California green was represented by a 1-tier construction consisting of only the root zone. Experimental greens constructed to each profile design also contained either a higher or lower permeability root zone. The other factor investigated was the effect of green slope on water drainage and redistribution.

THE RESEARCH APPROACH

This study employed 4 green construction approaches consisting of:

1. A 1-tier soil profile containing a 9:1 sand:sphagnum root zone.
2. A 1-tier profile containing a 6:2:2 sand:biosolids compost:topsoil root zone.
3. A 2-tier soil profile containing the 9:1 sand:sphagnum mix.
4. A 2-tier profile containing the 6:2:2 sand:compost: topsoil mix.

Based upon independent testing by an accredited lab, both root zone mixes met the particle size and performance criteria for a USGA root zone. Additionally, the sand:sphagnum mix, although not entirely pure sand, met the recently proposed performance criteria of a CA root zone (Hummel, 1998). The sand:sphagnum root zone had a permeability of 530 mm hr^{-1} and is referred to as the higher-permeability mix while the sand:compost:topsoil blend had a permeability of 320 mm hr^{-1} and is referred to as the lower-permeability mix. Gravel selection for the drainage blanket of the 2-tier profiles and for the drain line trenches of the 1-tier profiles were based on the particle sizes of the respective root zones corresponding to USGA recommendations for constructing a putting

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green that does not contain an intermediate layer (U.S. Golf Association Greens Section Staff, 1993). The four treatments were replicated three times for a total of 12 experimental greens. At the time of the study, the greens contained a 15-month-old, Penncross creeping bentgrass turf maintained at a mowing height of 4.7 mm.

The greens were built above ground in 1.2 by 7.3 m wooden boxes supported by a legged, metal framework. Drainpipe trenches (15 cm wide by 20 cm deep) extended below the profiles, with each containing an outlet. The drain line trenches (perpendicular to the long axis) were constructed into each green at 0.6, 3.7, 5.2, and 6.7 m from the downslope end. PVC pipes were connected to the outlet of each drain line trench, with each fitted with a valve for selective closure. The present study was conducted with only the 0.6 and 5.2 m drain lines open, effectively yielding a drain spacing of 4.6 m. The 12 research greens were placed in a randomized complete block design on an 24 by 8.5 m concrete pad. This allowed adjustment of the green slope by jacking and blocking the metal legs. Green slopes used in this study were 0%, 2%, and 4%.

The root zones of each experimental green were instrumented with soil moisture probes at three depths (7.6, 15.2, and 22.8 cm) and five locations (0.6, 2.1, 3.7, 5.2, and 6.7 m from the downslope end of the green) for a total of 15 positions per green. The probes were connected to a measurement system that allowed frequent monitoring of soil moistures. Additionally, tipping bucket rain gauges were connected to the drainage outflow pipe of the furthest downslope drain line to monitor drainage outflow rate.

This experimental set-up was used to monitor water drainage and redistribution within the root zone as influenced by green construction method, green slope and rainfall rate. The overall study was conducted as a series of 18 experimental runs. During an experimental run, individual greens were configured to a predetermined slope of 0%, 2%, or 4%. Additionally each green received rainfall from an overhead rain simulator set to deliver either a high (110 mm hr^{-1}) or low (45 mm hr^{-1}) rainfall rate. Rainfall was applied for 3 hours to ensure a constant drainage rate. At the end of the rainfall period, the rain device was turned off.

Drainage outflow was measured every 5 minutes for both the 3-hour rainfall period and for a 48-hour drainage period. Soil water contents were measured every 20 minutes for the 3-hour rainfall period and for the first 24 hours of the drainage period. Soil moistures were measured hourly for the remaining 24 hours. This resulted in about 44,000 total drainage outflow and 113,000 total soil moisture measurements for the full 18 runs of the study. Data collection began on 6 August 1997 and ended on 30 October 1997.

RESULTS

Due to space limitations, only a portion of the data collected in the study will be presented in this article. Specifically, we will present only the high rainfall rate data since after the first two hours of the drainage period, rainfall rate had little effect on the experimental results.

During rainfall, drainage rates from the research greens exhibited a significant interaction between profile design (either with or without a gravel blanket) and root zone permeability. The 2-tier profile greens, containing the gravel blanket, had larger drainage rates than the 1-tier profile greens.

Drainage rates between the two root zone profiles differed significantly. The 2-tier profile greens (right) had a greater drainage rate than the 1-tier greens (left).

Additionally, drainage rates from the 2-tier greens were essentially the same regardless of root zone permeability. This result differed from that of the 1-tier greens, where drainage rate during rainfall was substantially reduced for the lower-permeability root zone compared to the higher-permeability root zone. Finally, drainage rates in the 2-tier greens consistently increased with increasing green slope, while this was not the case for the 1-tier greens.

Although drainage rates were much smaller after 27 hours without rainfall, outflow was still observed from all research greens. The 1-tier greens had greater overall drainage rates than the 2-tier greens, due principally to differences between the higher-permeability root zone treatments. Also reversed from that observed during rainfall, was the effect of green slope, where drainage rates of the 1-tier greens exhibited a larger increase with increasing slope than the 2-tier greens.

Just as drainage rates showed an interaction between profile design and root zone permeability, the pattern of soil moistures through a cross-section of the root zone yielded a similar interaction. This pattern is illustrated by Figures 1 and 2 where isobands of soil moisture are shown as a function of distance upslope and root zone depth for each of the profile design:root zone permeability combinations. Also, the individual figures correspond to green slopes of 0% and 4%.

After 48 hours drainage at 0% slope, both 1-tier profiles showed an effect due to drain spacing. Relatively drier soils were observed over the drain lines at 0.6 and 5.2 m, and wetter soils were observed between the drains. This contrasts with the 2-tier profiles where soil water contents were more uniform laterally across the green. As expected, root zone permeability yielded wetter soil moistures for the lower-permeability root zone for both profiles. It was interesting, however, that the levels of near-surface soil moisture were similar in the 1-tier higher-permeability and 2-tier lower-permeability greens.

All research greens exhibited increased water contents with root zone depth. In both permeability rates for the 1-tier profiles, water contents increased by about 15% to 20% from the 5 cm to the 25 cm depths. The 2-tier lower-permeability greens yielded about a 10% increase and, while not readily apparent from the figures, the 2-tier higher-permeability greens had a 4% increase in water content with depth.

The patterns of soil moisture for greens sloped at 2% were somewhat similar to that observed at 0% slope. This small slope applied to the greens, however, generated some downslope accumulation of soil moisture for all systems. Consequently, the soil moisture pattern due to drain spacing in the 1-tier profile greens was skewed in the downslope direction and downslope water accumulation, particularly at depth, was observed in the 2-tier greens. This downslope, soil water accumulation was accentuated in all greens after 48 hours at 4% slope. Drain spacing effects disappeared for the 1-tier greens and evidence of water perching in the 2-tier greens was absent near the upslope end. Finally, the 4% slope had the greatest influence on near-surface soil moistures in the 1-tier lower-permeability greens, where water contents ranged from 37% to 25% within a distance of about 5.5 m.

It is important to point out that whereas results of Figures 1and 2 are for 48 hours of drainage, similar soil moisture patterns were observed at earlier sampling times. The exception was that overall water contents were greater at earlier sampling times and slope effects did not become apparent until about 12 hours after rainfall stopped.

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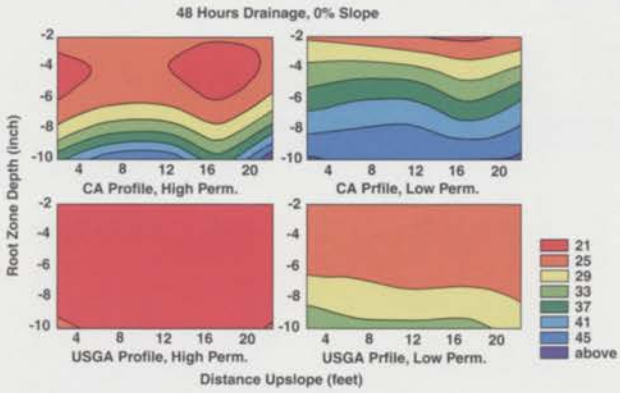

Figure 1. These contour plots demonstrate the soil moisture (% by volume) after 45 hours of drainage for research greens sloped at 0%. Individual plots show results for the 1-tier profile with a higher-permeability root zone, the 1-tier profile with a lower-permeability root zone, the 2-tier profile with a higher-permeability root zone, and the 2-tier profile with a lower-permeability root zone. Each plot shows moistures in a cross-section of the root zone with the horizontal axis given as distance upslope (m) and the vertical axis given as root zone depth (cm). The plots are shown with the vertical axis expanded 16.7 times true scale.

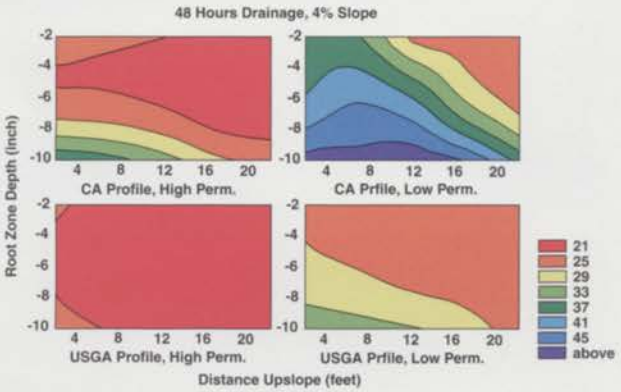

Figure 2. Contour plots of soil moisture (% by volume) after 45 hours of drainage for research greens sloped at 4% demonstrate the differences in drainage characteristics between the 1-tier and 2-tier greens.

IMPLICATIONS

This research illustrates that when it comes to greens drainage we need to go beyond considering just the root zone permeability or just the profile design and consider the interaction of these two factors. Given equal root zone permeability, the 2-tier profile yielded more rapid drainage. Indeed, even rainfall rates of about 110 mm hr-1 failed to overwhelm drainage of the 2-tier profiles as evidenced by equivalent drainage rates for both the lower- and higher-permeability root zones. Consequently, it appears that 1-tier profiles need a root zone permeability about 500 mm hr^{-1} greater than 2-tier profiles to yield similar drainage rates. Of course, greens built to California recommendations may be reasonably expected to have these higher permeabilities since the root zones frequently contain pure sand.

Drainage rate represents an intensity attribute. The capacity attribute of subsurface drainage, in the context of the present study, is the completeness of excess water removal from the respective root zones. Here, it is commonly thought that formation of a perched water table in a USGA green would result in a less completely drained root zone than a CA green. Our results show that for equal root zone permeabilities the experimental 2-tier greens are drier after 45 hours (interpreted as having an increased drainage capacity) than the experimental 1-tier greens. Also, the 1-tier greens exhibited greater soil moistures midway between the drain lines. Both of these soil moisture features result from the need for water to move laterally through the root zone in a California green before reaching a drain line. This rather slow route for water to exit the root

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Green Profile	Root Zone Permeability	Green Slope	Drainage Rate During Rainfall	Drainage Rate 27 Hours
		%	---------- liters hr-1 ----------	
1-Tier	Higher	0	223	0.83
		2	253	1.93
		4	197	1.97
	Lower	0	38	0.30
		2	23	0.83
		4	11	1.74
2-Tier	Higher	0	310	0.49
		2	491	0.79
		4	529	0.91
	Lower	0	306	0.64
		2	370	1.09
		4	552	1.13
LSD (0.05)			42	0.53

Table 1. Mean drainage rates during rainfall application and after 27-hours of drainage for the experimental putting greens.

zone, as compared with flow into and through the gravel of a USGA green, would suggest wetter soil conditions even after 45 hours of drainage. Again, for more complete drainage, a CA green appears to need higher root zone permeability than a USGA green.

This research also illustrates that we need to consider how a putting green, either a CA or USGA construction fits into the landscape; that is, the green slope and direction. Green slope clearly had an effect on water redistribution following rainfall, and did so for both experimental putting green construction methods. Within each profile design, however, the lower permeability root zone yielded enhanced downslope accumulation simply because there was more moisture retained and accessible for migration in this root zone. Interestingly, increasing slope in the 1-tier profiles resulted in greater drainage rates at 27 hours and slightly drier root zones after 48 hours. Thus, green slope may be beneficial for continued drainage of a CA green.

On the other hand, the slope-induced, lateral differences in soil moisture observed for both the 1-tier and 2-tier greens appears to be analogous to spatially non-uniform soil moistures observed within greens on golf courses. This spatial non-uniformity may result in the formation of localized drying or "hot spots" at upslope locations and excessive soil wetness in downslope locations. Both greens construction methods apparently face this dilemma.

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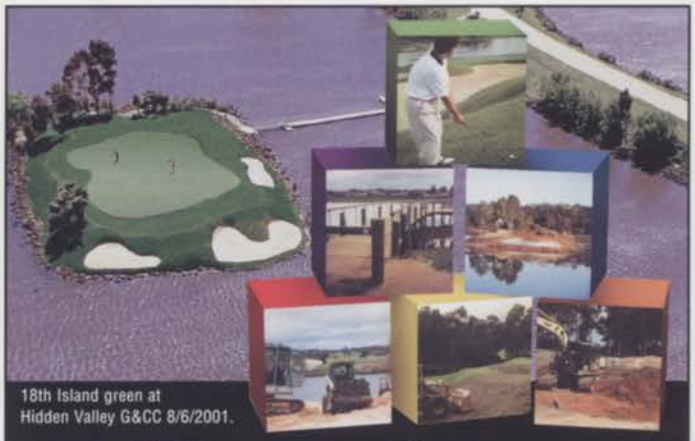

18th Island green at Hidden Valley G&CC 8/6/2001.

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By John Neylan

Dr. Jim Moore, (USGA) lecturing at the Commonwealth Golf Club in Victoria

GREENS CONSTRUCTION WORKSHOP

We have recently been very fortunate to have Jim Moore from the United States Golf Association, Greens Section presenting a series of workshops on greens construction.

Jim has had many years experience in golf course construction as a Golf Course Superintendent, Regional Agronomist with the USGA Greens Section and now in his role where his total responsibility is construction issues.

The workshop was very informative at both a technical and practical level. It did not preach the USGA method of construction but rather the principals behind what makes a good green function. Jim outlined the problems they face in the USA with greens construction and they were all applicable to Australian conditions.

Design, drainage, sand selection, construction techniques and quality control were identified as critical factors that determine the success of any construction project.

The key points that I gained from the workshop were;

1. Create a firm base with no low spots.
2. Installing a perimeter drain at the low point of the base to remove any accumulated water at the interface of the green and the native soil.
3. Marking the drainage system with a tracking wire or at least mark the inspection point with a metal plate.
4. The hydraulic conductivity only needs to be in the accelerated range (i.e. 300 – 600 mm/m) when high salinity water is used for irrigation. Unnecessarily high hydraulic conductivity soils results in excessive nutrient leaching and lower moisture retention.
5. Surface drainage is still an integral part of the complete drainage package for golf greens. This is a strong message for golf course architects.
6. Superintendents must be more proactive in selecting construction and rootzone materials.
   - Need to identify preferred construction materials.
   - Sample and test beforehand.
   - Specify for constructors what materials will be used.
   - Do not rely either on the constructor or the materials supplier to select the rootzone sands and gravels.
7. Initiate a quality control program
   - Collect initial samples of materials
   - Select a laboratory and stay with that laboratory so as to maintain consistency
   - Ensure that the blended materials meet specification.
   - Establish "target" test values and acceptable ranges for each test parameter.
8. The gravel layer is very important in "equalising" soil moisture on the surface of the green.

The take home message is to have a works program, take time to select and test construction materials, have a quality control program and provide close supervision.

There is a large amount of excellent reference material available on the USGA web site: www.usga.org and AGCSATech can assist in all your soil analysis and construction planning requirements.

DISEASE OF THE MONTH!

Australia's climate often seems to be one of excesses; whether it is hot and dry, cold or wet and humid. With these variable weather conditions come a variety of turf diseases over summer. There were several parts of Australia that experienced extended wet weather with algae being a persistent problem.

Algae in turf can be one of the more difficult maladies of turf to cure, particularly if there are underlying turf and soil problems. As with many diseases it is symptomatic of other causes that need rectification.

Of the various algae associated with turf, the Cyanobacteria forms are generally considered the most troublesome. Algae consists of microscopic cells that vary in shape from unicellular rods or spheres to filamentous strands in which the individual cells are arranged end to end. Algae can vary in colour, with green (chlorophyll a), yellow (carotenoids) and blue (phycocyanin) being predominant. These colours are photosynthetic pigments that utilize light in the production of food for the algae in the same way that plants function.

Algae is usually a major problem during warm weather when there is regular irrigation or frequent rainfall events. Stresses such as high temperatures and humidity and summer diseases can cause turf thinning which exposes the algae to light and stimulates its development and spread. The use of nutrient rich water (e.g. recycled effluent) and high fertility can contribute to its development.

An algae scum forms a gelatinous "mat" that has a slightly sticky or rubbery texture when wet and is a firm to hard crust when dry. An algae crust that dries out can often be peeled off the turf surface. Algae is not a parasite such as fungal organisms, but competes with the grass for space, seals the turf surface restricting infiltration, clogs soil pores (reducing drainage and aeration) and restricts the penetration of plant protection chemicals. In new sowings, the algae scum will smother the immature seedlings.

Under certain circumstances, algae can be a vigorous invader of golf greens

Algae as viewed under a microscope

There are various conditions that favour algal growth including;

- **Surface water:** Water is a major factor in algae development. Algae commonly occurs when the soil surface remains wet due to excessive irrigation, frequent rain or poor surface drainage.
- **Light:** Algae development is favoured by high light levels. However, algae will also proliferate in shaded areas due to the high surface moisture. On golf and bowling greens, with low cutting heights, there is a greater exposure to light for algae growth.
- **Soil compaction:** Soil compaction is an underlying problem commonly associated with algal scum. Compaction maintains high surface moisture and weakens the plant, providing ideal growing conditions for the algae.
- **Soil pH and fertility:** Low fertility that results in a reduction in turf density, favours the growth of algae. Acid soils are also favourable for the development of algae.

The control of algae is dependent on identifying the primary cause(s) for its appearance. An important aspect of algae control is the rapid removal of surface water. This is achieved by cultivation (eg. minityning, spiking, etc.) and improving surface drainage. Thatch control is also important.

When algae is well established, every effort needs to be made to dry out the surface. This will involve several procedures, including the application of an algacide such as mancozeb or iron sulphate, to dry up the algal scum, followed by verticutting or spiking to break up the algal crust and to stimulate grass recovery. On-going applications (2-3) of an algacide every 7 days or so will be required to assist in re-establishment of the grass. Any algacide application will require dry weather for effective control.

The AGCSA's Sportsturf Protection Manual provides a comprehensive list of registered algacides.

18th Australian Turfgrass Conference Floor Plan and Exhibitors List

Horticulture Australia

COMPANY	EXHIBIT #
Abulk	43
AGCSA	9+10
Antonio Carraro Pty Ltd	62+63
Aspac Golf and Turf	39+40
BSF Golf Management	50
Chipco	52+53
Club Car	82
Country Club International	86 (a)
Croplands Equipment Pty Ltd	92
David Golf and Engineering	80
Dint Greenkeeping	64+65
Evergreen Turf	33
Foley Grinders	45
Globe Aust.	31+32
Graden Industries	89A
Greencare Industries	88
Hardi Spraying Equipment	83
HG Turf	51
Hunter Industries	60+61
Industrial Mowers	71
JFB Agencies	22+23
Jimboomba Turf	2
John Deere Limited	86
JSB Equipment	3+4
Locksand	30
Nutri-Grow biotechnologies	37
Nuturf Pty Ltd	79
Parklands Trading Company	38+41
Plateau Couchgrass	46
Rain Bird Golf	78
Redexim bv	76
R+R Fumigation	70
Scotts Australia	47+48
Silvan Pumps and Sprayers	72-75
Simplot Turf & Horticulture	77
StrathAyr	87
Textron Turfcare Group	85
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Toro Australia	84
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Turf & Irrigation Pty Ltd	81
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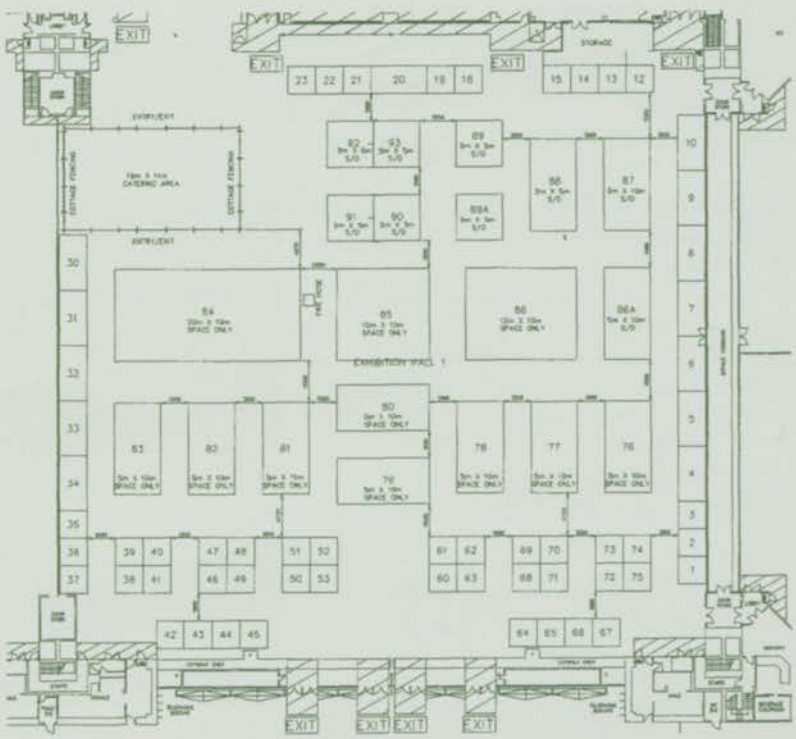
Turf Link Australia	91
TurfCraft International	69
Turfgrass Association of Australia	44
TurfMach Australia	90
Twin View Turf	1
Tyco Flow Control Pumping Systems	93
Water Equipment Technology	5



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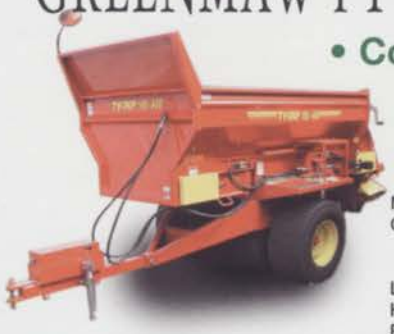

MH 400 TyCrop topdresser with cross-conveyer & swivel.

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- The AGU Open Championship Course, Moonah Links, Vic
- The Dukes Course, St Andrews Scotland.
- The Links, Port Douglas, Far North Qld.

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- Moonah Links, Rye.
- The Links, Port Douglas.

Line planter in operation at Ocean Course, The National, Cape Shank.

CONFERENCE PROGRAM

GOLF COURSE MANAGEMENT STREAM

SUNDAY JUNE 16TH

7.00am	**Pre Conference Tour (Nth Lakes QDPI) Bus Departs from Convention Centre**
8.00am	**AGCSA Award Judging** Rydges Southbank Hotel
3.00pm	**Registration Desk Opens,** Plaza Room 4, Brisbane Convention Centre
7.00pm	**AGCSA Golf Champions Function** Sponsored by Toro Australia Rooftop Terrace, Rydges Hotel, Southbank Brisbane

MONDAY JUNE 17TH

6.00am	**Buses Depart for AGCSA Championships** Rydges Southbank Hotel
7.00am	**AGCSA Toro Golf Championships** Royal Queensland Golf Club
1.00pm	**AGCSA Golf Championships Presentation Luncheon**
5.00pm	**AGCSA Awards Presentation Ceremony** Plaza Room 6, Brisbane Convention Centre Followed immediately by the Welcoming Cocktail Reception sponsored by Chipco. The WCR is to be held in a secret location. Attend the Awards Presentation Ceremony and you will be transported to the Welcoming Cocktail Reception.

TUESDAY JUNE 18TH

8.00am	**"New and Emerging Turfgrass Diseases"** Presented by Joe Vargas, Michigan State University
8.45am	**AGCSA Award Winners Presentations**
9.00am	**Trade Show Open**
10.15am	**Trade Show, Morning Tea, Lunch**
1.30pm	**"Greens Surface Preparation- A World of Ideas"** Panel Members include: Dr. Joe Vargas, Dr. Richard Gibbs, Dr. Earl Elsner, Martin Gunn, British and International Golf Greenkeepers Association and three of Australia's leading Golf Course Superintendents
3.00pm	**Trade Show and Afternoon Tea**
5.00pm	**AGCSA Annual General Meeting, Sponsored by Rain Bird Golf (Australia)**
5.00pm	**Trade Show Close**

WEDNESDAY JUNE 19TH

8.00am	Workshop 1A **"Golf and the Environment- An Audubon experience"** Presented by David Warwick, GCS, Avondale Golf Club, Andrew Baker, GCS at the Sanctuary Cove Resort and Martin Gunn, BIGGA Workshop 1B **"Poa annua for Greens"** Presented by Dr. David Huff, Penn. State University Workshop 1C **"The new hybrid dwarf couchgrasses, their breeding and management"** Dr. Earl Elsner, Georgia Seed Development Commission
9.00am	**Trade Show Open**
10.00am	**Trade Show and Morning Tea/Lunch**
1.30pm	Workshop 2A **"Turf root health, an interaction between nematodes, fungi and beneficial organisms"** Presented by Dr. Graham and Marcelle Stirling Workshop 2B **"Making a case - public speaking and negotiation skills."** Presented by Terri Clemenston, Reardon Rothbard Workshop 2C **"Get it right the first time, application technology to maximise the performance of your pesticides."** Presented by John Kent, Charles Sturt University
2.30pm	**Trade Show Close**
6.00pm	**Conference Dinner, Plaza Room 6** **Band:** *Lush*

THURSDAY JUNE 20TH

9.30am	Workshop 3A **"Getting the best deal - preparing estimates, quotes and tenders."** Presented by Paul Simpson, Arup Consulting Workshop 3B **"Harnessing the power of data and information collection to produce effective decision making in turfgrass management."** Presented by Professor Peter Martin, University of Sydney, Workshop 3C Tour of Redlands Research Facility of the QDPI (buses depart 7.30am from Convention Centre)
11.30am	**Lunch**
12.30pm	Workshop 4A **"Maintain, monitor and evaluate irrigation systems"** Presented by the IAA Workshop 4B **"Human Resource Management"** Presented by Stephen Marsden, Course Superintendent, Lakelands Golf Club and John Odell, Course Superintendent, The Royal Sydney Golf Club. Workshop 4C **"Does it really work?- How to undertake your own product trials"** Presented by John Neylan, AGCSATech
2.30pm	**Afternoon Tea**
3.00pm	**Thinking Superintendent Sessions** **"Waste Management for Scarifiyings"** Presented by Robert Macdonald **"Converting Penncross to Suttons at the Royal Melbourne Golf Club"** Presented by Jim Porter, Royal Melbourne Golf Club

FRIDAY JUNE 21ST

9.00am	**Open Forum "Greens Construction -What are the essential elements"** Panel members include John Neylan, Dr. Joe Vargas, Dr. Richard Gibbs, Gary Beehag, Martin Gunn
10.30am	**Morning Tea**
11.00am	**"The Effect of Rootzone Composition and Cultivation Treatment on Soil Physical Condition and Rootgrowth."** Presented by Dr. Richard Gibbs, New Zealand SportsTurf Institute
11.40am	**"Topdressing and black layer development"** Presented by Dr. Joe Vargas, Michigan State University
12.30m	**Lunch**
1.30pm	**"Leadership in a small team environment"** Presented by Terri Clemenston, Reardon Rothbard
2.30pm	**Afternoon Tea**
3.00pm	**Summary of papers and review** Chaired by Professor Peter Martin, University of Sydney.
4.00pm	**Close**

GENERAL TURF MANAGEMENT STREAM

SUNDAY JUNE 16TH

2.00pm	**Registration Desk Opens** Plaza Room 4, Brisbane Convention Centre

MONDAY JUNE 17TH

5.00pm	**AGCSA Awards Presentation Ceremony** Plaza Room 6, Brisbane Convention Centre Followed immediately by the Chipco Welcoming Cocktail Reception to be held in a secret location. Attend the Awards Presentation Ceremony and you will be transported to the Chipco Welcoming Cocktail Reception

TUESDAY JUNE 18TH

8.00am	**"Leadership in a small team environment"** Presented by Terri Clemenston, Reardon Rothbard
8.45am	**"Preparing estimates, quotes and tenders"** Presented by Paul Simpson, Arup Consulting
9.30am	**Trade Show, Morning Tea, Lunch**
11.00am	**"Sportsfield construction and drainage - Case Studies and Forum"** Panel members include Peter McMaugh, Trevor Siviour
12.15pm	**"Reducing Soil Compaction in Sportsfields"** Dr. David Aldous, University of Melbourne
12.45pm	**Trade Show**

WEDNESDAY JUNE 19TH

8.00am	**Trade Show**
10.00am	**"What's around the corner - new turf for the new century"** Presented by Dr. David Huff, Penn. State University
10.40am	**"Getting it right the first time, application technology to maximise the performance of your pesticides"** John Kent, Charles Sturt University
11.20am	**"Eco-Efficiency for turf - the triple bottom line"** John Neylan, AGCSATech
12.15pm	**Lunch**
2.30pm	**"Key performance indicators for sportsfields"** John Neylan, AGCSATech
3.30pm	**"Cricket Pitch Research - the latest "** Presented by Dr. Richard Gibbs, New Zealand SportsTurf Institute
4.00pm	**Summary, review and close**

2002 Award Nominations

Award Sponsors

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AGCSA Excellence in Golf Course Management Award	Tim Chape	-	Hartfield Country Club
	Gary Bass	-	Croydon Golf Club
	Max Laverty	-	Redland Bay Golf Club
	Kenton Boyd	-	Fox Hills Golf Club
	Wayne Hawley	-	Bexley Golf Club
	Damon Quigley	-	Mount Martha Valley Golf Club
	Anthony Fogarty	-	Catalina Country Club
	Robert Millington	-	The Vines Golf Club of Reynella
	Rodney Cook	-	The Grand Golf Club
AGCSA Graduate of the Year	GlennVanlieshout	-	The Vines Golf Club of Reynella
	Simon Moore	-	Royal Adelaide Golf Club
	Glenn Dawson	-	Federal Golf Club
	Glenn Johnson	-	Ryde Parramatta Golf Club
	Andrew Wheatley	-	Queanbeyan Golf Club
	Mathew Bull	-	Royal Canberra Golf Club
	Scott Walker	-	The Grand Golf Club
	David Phillips	-	Woodlands Golf Club
	Peter Bennie	-	Roshill Country Club
	Kyle Schwebel	-	Terrigal Memorial Country Club
	Luke Pastyn	-	Glenelg Golf Club
AGCSA Claude Crockford Environmental Award	Jeffrey Austen	-	El Caballo Golf Resort
AGCSA Distinguished Service Award	This award is to be bestowed		

The AGCSA has great pleasure in announcing the nominations for this years AGCSA Industry Awards.

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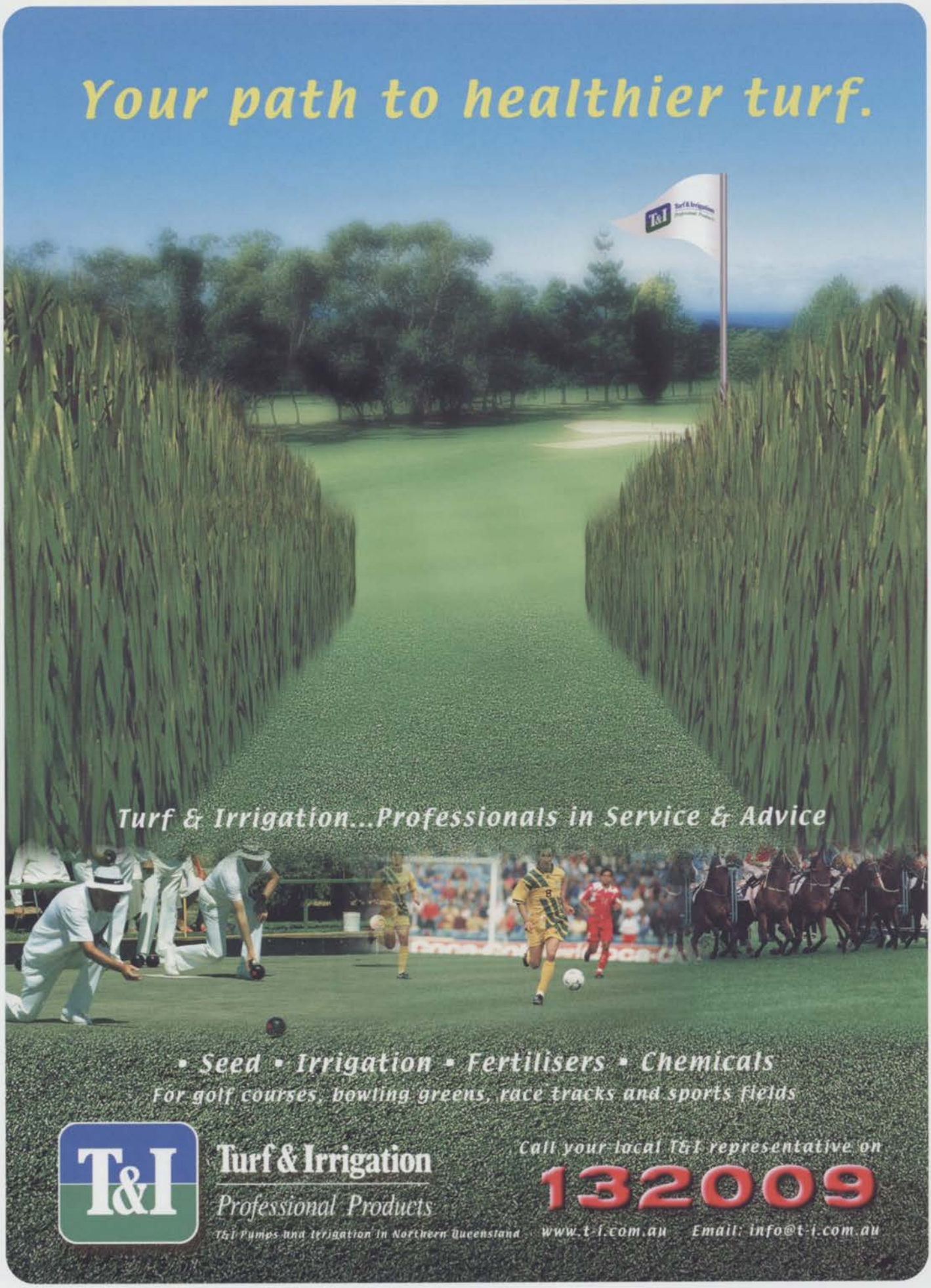
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Exhibit # 50 - Abulk

One turf variety that is providing to be very popular lately is Palmetto St. Augustine (dwarf soft leaf buffalo). Palmetto has an outstanding emerald green colour that is a true eye catcher. It performs well in full sun, even in very hot, humid climates, yet thrives in shaded areas where other grasses fail. It is also varieties. It will remain evergreen in most areas of Australia. As growers of Viro-cell, Viro-tube, Flora-Edge, native grasses, trees, shrubs and wetland plants, we have a wide range of natives to offer. Some of the latest products on the market include "The Lea Range", a variety of coloured Pennisetum, including Black lea, a larger variety with colourful purple seed heads. We also have "Nafray", the compact, tougher variety of the Pennisetum alopecuroides range. Lomandra longifolia, "Tanika". This extraordinary plant is super drought tolerant, half the height of normal longifolia and a fine leaf variety. Lastly, our new wetland Flora-Edge strips. *Come and see why these wetland plants will survive where others won't.*

Exhibit # 62+63 - Antonio Carraro

Antonio Carraro Oceania is a subsidiary of the Antonio Carraro factory in Italy, which produces compact 4WD turf tractors that offer a number of benefits over conventional tractors in their field. Low ground pressure, 5-second reversibility, multi-functionality, compact dimensions, excellent visibility, fantastic manoeuvrability, hillside safety and shorter working times are all features of Antonio Carraro tractors. Combined they result in a fast, efficient, safe machine capable of working on delicate turf in the worst conditions without causing any unnecessary damage to the surface.

The Antonio Carraro is extremely versatile & can be fitted with a large range of implements including out front mowing decks, aerators, loaders, and many others. Models range in horsepower from 36hp to 83 hp and include both mechanical and hydrostatic transmissions. Suitable for maintaining parks, sports grounds, golf courses, racetracks, Antonio Carraro tractors have been involved in the maintenance of some of Australia's most famous turf, including the M.C.G., Colonial Stadium, Royal Sydney Golf Course, Royal Randwick Racecourse, and Stadium Australia.

Exhibit # 39+40 - Aspac Golf and Turf

TORNADO TM360 AND TORNADO TM360XL DEBRIS BLOWERS

These popular debris blowers are the most effective and quietest debris blowers on the market, and the TM360XL which will be on show for the first time in Australia boasts an amazing 12500 cubic feet of air per minute, more than 60% more volume than any other unit on the market.

DAKOTA TURF TENDER 410 GREEN DUSTING SYSTEM

For any client considering the purchase of a greens dusting unit or conventional topdresser, come and see why the Dakota 410 has no rival when it comes to all round performance. Able to lightly dust, heavily topdress apply fertiliser and couch stolons, the dakota 410 can do it all

EARTHQUAKE

Forget Verti Draining, the Earthquake is the next generation deep turf aerator, able to penetrate 10 to 15 inches, with the unique "wave" action decompacting and fracturing soil structure with virtually no surface disruption. The Earthquake makes its Australian debut at the AGCSA conference, and we encourage you to book a demonstration on your turf.

BUSH HOG GENUINE BEDKNIFES

For those courses that are yet to experience the advantage of genuine BUSH HOG bedknifes, visit our stand and see the quality for yourself, and take advantage of our 60 day money back performance guarantee.

Exhibit # 77 - Simplot Turf & Horticulture

Turfcare Supplies Victoria, A division of J.R. Simplot Australia (Turf & Horticulture) along with all of the Best fertilizer distributors have formed a group to be known as A.T.T. (Australian Turf Traders) The purpose is to ensure that all of our customers have access to the best possible products at the best possible price with the same level of individual service.

September 2001 – The group of Australian Turf Traders was formed. Australian Turf Traders or A.T.T. has members operating in four states:

- Turfcare Supplies in Victoria
- Turfcare (N.S.W) in New South Wales
- T-Link in South Australia
- Northern Rivers Rural Buying Services in Queensland

This enthusiastic group of individuals is now an enthusiastic group working closely with manufacturers, Industry identities and customers alike to ensure a quality range of innovative products and services are delivered at the best possible prices to our wide range of clients. Discuss your overall business requirements with an A.T.T. member about you speciality fertiliser needs, in particular the unique range of slow release fertilisers based on UMAXX technology. Visit our booth – No. 77 at the 18th Australian Turfgrass Conference.

Exhibit # 18 - BSF Golf Management

MACHINERY MANAGEMENT AND TURF MANAGEMENT CONTRACTS, SALES, SERVICE AND REPAIRS

BSF Golf Management Pty. Ltd. (formerly BSF Commercial Mowers and Golf Course Management Systems), operates a number of five year machinery management contracts.

This concept has been developed in Australia by the Company which currently has 15 golf clubs on contracts, under which BSF provides, new, all of the dedicated machinery under a fixed term contract. Regular weekly maintenance service is carried out, with all parts and labour included in the monthly contract price. The company is also gaining a reputation for its high quality turf management contracts at public golf courses; it currently operates seven such contracts, the aim of which is to offer reasonably priced, superior quality turf management for the green fee golfer.

BSF is also the premier Australian provider of:-

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- Sale of spare parts;
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BAYSWATER, VIC. AUSTRALIA 3153
TEL: 03 9738 2433 FAX: 03 9738 2455
Email: bsfgolf@bigpond.com Website: www.bsfgolf.com

Exhibit # 52+53 - Chipco

Chipco continues to offer professionals in the Australian Turf industry dedication and support. Investment in Chipco products is a pledge to the long- term viability of the Australian turf industry. This commitment and long- term support will only be enhanced by the pending integration into Bayer Environmental Science. This integration will bring together two of the biggest research and development turf companies in the world.

Chipco has an unprecedented and ever increasing range of products including key Fungicides, Insecticides and Herbicides. Our aim is to continuously support the turf industry through extensive research and development both in Australia and internationally. We are constantly looking for potential new molecules that are ideally suited to the Australian market, as well as searching for new products.

Our development team are always looking at new technologies which will improve the efficacy of our existing products, and take into consideration new pests and changed climatic conditions. Your support of Chipco will enable the continued investment in turf research both locally and internationally.

Chipco delivers innovative and affordable integrated turf management strategies and tools that perform effectively, efficiently and in an environmentally sustainable way. Those involved in turf management, know that taking shortcuts is not sustainable in the longer term. Chipco sees the sustainability of the industry as an essential element - this is why we continue to sponsor the Claude Crockford Environmental Award. Our 2001 recipient Andrew Baker from Sanctuary Cove and previous recipients realise the importance of environmental sustainability.

The Claude Crockford Environmental Award is designed to enhance the reputation of turf managers as responsible caring custodians of the natural environment. Chipco staff all look forward to congratulating the 2002 winner. Our Chipco team has an amazing depth of experience and knowledge and are always willing to help with any enquiries that you may have. *Come and join us for a chat at the Chipco Stand in Brisbane.*

Exhibit # 82 - Club Car

Club Car are proud to support the 2002 Turfgrass Conference and will feature a complete display of our Turf Utility Vehicles. We also expect to feature new models and urge superintendents to visit our display to see an innovative model never seen in Australia before. They will experience a world first preview of this surprising new vehicle.

Exhibit # 86A - Country Club International

Country Club International are the major Australian suppliers of golf range equipment from Europe and USA plus specialist suppliers of environmentally friendly chemical spray equipment, 3-point linkage quick hitches, environmental chemicals, netting for impact and high safety screens, golf course signage and rubber paving. Companies represented include Range Servant Sweden, Redden Netting USA, Pro Turf Golf Mats, Enviromist, Soil Zyme, Flexitect Pacific, Netting Australia, Groovy Signs, Derone Enterprises USA, Triangle Hitch Norway, Herbi Spayers and a range of associated lines. Offices are based in Melbourne and the Gold Coast with agents in Singapore, Hong Kong, NSW and South Australia.

Contact Greg Walker on (03) 9570 2202 or 0417 317 194 or Mike Baker on 0418 314 417.

Exhibit # 92 - Croplands Equipment

Croplands Equipment Pty Ltd, based in Adelaide South Australia, is a subsidiary of the growing Corporation Nufarm Limited. Croplands manufactures and distributes throughout Australia and New Zealand, Agricultural, Horticultural, Turf and Amenity Spray Application Equipment, providing a complete range from the largest Self Propelled Sprayers down to all components and accessories needed to fulfil any spray application requirement.

With warehouses in Queensland, Western Australia, New Zealand and South Australia we cater for all markets in all regions. Croplands will be displaying a complete range of Golf and Turf Spray application equipment during the National conference.

A number of new products will be launched during this period, especially in the deck-mounted sprayers and field booms. With the increasing importance in regards to correct application, drift control, environmental awareness, Croplands has been putting a major amount of R&D resources into ensuring these topics are covered when we look at any new or existing products. Croplands works in very closely with a number of international companies to ensure we can bring to our markets the latest in spray application equipment. With companies such as TeeJet, MicroTrak, we are able to ensure we are offering the latest in nozzle application, Application monitors and Controllers with full software packages and GPS technology.

Exhibit # 80 - David Golf & Engineering

Over the last decade DGE has cemented its position as Australia's number 1 manufacturer and supplier of golf course and driving range equipment. How have we done this?

- Quality Products
- Excellent Pricing Policies
- Service without Compromise

Come to our stand and pick up a brochure highlighting all our NEW products from the Revolutionary 'D' Putting Cup to The Worlds Number 1 Utility Vehicle by E-Z-GO

Come and see us at stand number 80 for free giveaways, competitions and surprises.

Exhibit # 64+65 - Dint Australia

DINT Australia is a major supplier of golf course equipment in this country. After more than 12 years in the business of supplying golf course equipment, DINT continues to expand – developing new products and services and recently expanding into the corporate sales of our product range.

DINT can be seen on golf courses in all states of Australia supplying a wide range of equipment from putting cups to flagsticks, to golf putters, signage and much more. DINT'S Philosophy of quality, service and value for money result in providing Golf Clubs with Australian made, attractive and long lasting products for their courses.

The PGA Tour of Australasia also choose to use DINT Products on their tour. See us on our stand to ask about our wide range of Greenkeeping Equipment, Recycled Plastic

Furniture and also our new line of products. DINT Australia, assuring you of our best quality and service at all times.

Exhibit # 33 - Evergreen Turf

Evergreen Turf is growing!!! No this is not just a play on words...Evergreen Turf has dramatically expanded its product range to become one of the leaders in overall turf grass solutions in Australia. Evergreen not only produce warm and cool season turf varieties but can offer Stabilizer Solutions, Fertilizers, Tall Fescue Seed and now even a range of exclusive turf handling and turf manufacturing equipment. You don't have to look any further than Evergreen for:

Turf Grids: for the unique demands of each turf project these can only be addressed by a system that offers the designer a flexible and internationally proven methodology. Turfgrids have provided successful Turf Systems for a wide range of applications: Sports fields, Racetracks, Overflow carparks, high use / multi use sports venues and satisfy design requirements for load bearing capacity and shear strength.

Kesmac Turf Machinery: turf harvesters, truck mounted forklifts, reel and scarifying reel mowers are available. Kesmac harvesters are already in operation in Victoria, NSW and QLD and are rapidly expanding in sales due to their proven performance.

Progressive Turf Equipment: deck finishing mowers, these mowers are different due to that fact they have high lift rotary blades that create enough vacuum for a clean even cut.

Exhibit # 31+32 - Globe Australia

Globe Australia proudly joins the AGCSA in welcoming all delegates of the 18th Australian Turfgrass Conference to sunny QLD. Each year this conference and trade show gives us an opportunity to launch new products and catch up with old friends and this year we have a few exciting additions.

Significantly we are now the exclusive Australian distributor for the excellent range of Turf Tec Machinery, long regarded as extremely reliable, innovative and importantly – Australian Made. The selection is extensive with everything from power brooms and heavy-duty renovators to mowers and rollers for bowling greens.

Stan Wells, who heads up our machinery division, will be on hand throughout the show to explain the features and benefits of this equipment. Our display will also reflect our ongoing commitment to excellence and innovation in the important chemical, fertilizer and seed markets.

The official launch of "Spearhead" the exciting new broadleaf herbicide from Aventis will coincide with the show and we are proud to have been nominated as the sole national distributor. *We invite you to visit our stand and learn more about Spearhead from our staff.* Wayne Sear and Lisa Dillon from Barmac will be on hand to update you on additions to their chemical and fertilizer range and to introduce Ray Kimmel of Parkway, the American company who brought us market leaders such as Noculate, Neotrol and Pickup.

Exhibit # 89A - Graden Industries

Visit Graden's stand to be in the running to win a book signed by the author's of Keepers of the Green - A History of Golf Course Management. Written by - Bob Labbance & Gordon Witteveen

No difficult questions to answer, just come to the stand and put your name down.

While you are at our stand you will be able to view our new range of compact zero-turn mowers. Our new model will be on show for the very first time. Graden mowers come with heavy duty cutting decks ranging from 1050mm up to 1500mm, whilst the mower design maintains a low profile for getting in and around difficult to mow areas.

As always we will have our verticutters on show. In a very short time they have become the industry standard worldwide with most of the top courses owning Graden Verticutters. Come and see which big name courses from around the world use Graden in their renovation and maintenance programs, and why you should have one at your course.

Graden...great Australian design and manufacture.

Exhibit #88 - Greencare Industries

One hundred percent Australian owned, manufactures and supplies of turf renovation equipment to the golf course industry, Greencare will be once again displaying its commitment to the AGCSA in this the 18th Australian Turfgrass Conference 2002.

For the past 20 years Greencare has been an innovative leader to both the Australian and International markets. With its superior aeration technology Greencare is pleased to display its newest product the Coremaster Precision 1560 to help solve your aeration problems.

Whether your priority is depth, speed or accuracy, Greencare has designed this machine to meet your objectives. Achieving depths in excess of 165mm at a rate up to 100,000 square feet per hour. Precision 1560 delivers vertical holes, variable spacings and variable depths. Precision 1560 is designed as a vertical hollow tine aerator and performs equally well with solid tines. Tine sizes range from 6mm to 25mm.

Greencare's commitment to ease of maintenance and use has lead to the innovation and development of the first universal tine holder which allows the use of one holder to fit all standard tine sizes whether your needs are solid or hollow.

The Greencare booth will also feature the Coremaster 6 ECO pedestrian turf aerator, Shattermaster 6/250 deep slicer and of course the legendary Coremaster *12 tractor mounted aerator. A full range of tines, holders and our new QuadraGuard system for Quadra tines will be on display for your consideration.

So for further information or to discuss how our Field Service team can be of assistance to you please feel free to drop by our booth number 88 at the Show.

Exhibit # 83 - Hardi Spraying Equipment QLD

Hardi Spraying Equipment QLD will be displaying the 2000 L trailed sprayer specifically built for the Golf Course industry; this unit is enhanced by the addition of a fully computerised controller, which enables the operator to achieve very accurate rates. The trailer will be fitted with a 6m windfoil shielded trailing boom which has the ability to minimise spray drift. A simulated working H.C 2500 controller will be on display to allow superintendents to view its actual operation as it would in the field. As of June 30/2002 all distribution of Hardi product in Australia will come together as one company known as Hardi Spraying Equipment with its head office in Adelaide.

Product will be distributed through each state as is the case with the existing operations, customers will have an added advantage with the new company of a worldwide training scheme and a constant flow of very up to date information and a worldwide customer backup support system all existing key staff have been retained to provide continuing product support in Australia.

Exhibit # 51 - HG Turf

Sportsfield Product and services, including:
Motz Stabilised Turf used in Colonial Stadium, the MCG, the GABBA, Bruce Stadium and internationally; Washed Turf used by the Australian Institute of sport, High Performance Gravity Field System used by the GABBA and internationally; Prescription Athletic Turf Field System used by Grahame Park and internationally.

Exhibit # 60+61 - Hunter Golf

For two decades, seeing the Hunter name on irrigation products has meant a sign of unsurpassed performance and professionalism.

Possessing both a reputation as the industry innovator and ranking as the world's leading producer of gear-driven sprinklers, Hunter Industries has become the pre-eminent choice for irrigation systems. It's a preference that extends to everywhere you'll find a green expanse of turf – including residential properties, commercial sites, and professional sports fields, as well as on an ever-growing number of leading golf courses.

Today, with significant investments of both capital and manpower, Hunter has enhanced our focus on the field of golf course irrigation even further, establishing ourselves as the company by which all others will be measured. Visit our Exhibit and see the latest in our innovative product releases – especially the expanded range of Fully Top Serviceable *800 Series Rotors.* Also on show are our top selling *Genesis*

Control Systems in Conventional, Radio and Decoder configurations – the most flexible offerings in the market today. Hunter...where people, products and performance are above par.

Exhibit # 71 - Industrial Mowers Australia

Industrial Mowers (Australia) Limited will be displaying, the Industrial Mowers range of Quality Spare Parts including.

- Cutting cylinders
- Bed knives
- Grinding paste
- Mower blades

The Scott Bonnar Mowers and Scarifiers will also be displayed including a 24- inch petrol mower designed to suit Councils, Golf Clubs and Tennis Courts. Industrial Mowers will also be joined by Richard Lowman of Golf & Bowling, who will be demonstrating the latest in universal "Thatch-Away" heads suitable for all makes of greens mowers.

The staff of Industrial Mowers and Golf & Bowling are dedicated to the turf care industry and we look forward to seeing you at the Turfgrass Conference.

Exhibit # 22+23 - JFB Custom Golf Course Products

• FLAGPOLES • FLAGS • TEE MARKERS • BALLWASHERS • LITTER BINS • BOOTCLEANERS • CUPS • SIGNAGE • AND A WIDE RANGE OF COURSE MAINTENANCE TOOLS.

Free catalogue available at stand. JFB has been operating since 1986 and is fully Australian owned and operated. We supply many Golf Courses within Australia and New Zealand with quality products at realistic prices, both direct and via Distributors.

NEW AND IMPROVED PRODUCTS

(1)LIGHTWEIGHT ONE PIECE ALUMINIUM SHOVEL.

NEW AND STRONGER MODEL

Weighs only 1.5 kilos. The handle is set at an angle for easier use. (All Australian made) Half the price of imported models. Straight handle model also available.

(2)SAND BUNKER RAKE.

You have tried the rest! Now try the BEST!! (All Australian made)

(3)NEW AND NOW IMPROVED SAND BUCKET.

New stronger and more pliable plastic with stronger handle attachment.

Try before you buy. See for yourself at stands 22 – 23.

Exhibit # 2 - Jimboomba Turf Group

Jimboomba Turf Group has been supplying quality turf products backed up by exceptional customer service for 27 years. Specialising in all aspects of the turfgrass market, our turfgrass has been used on:

- ANZ Stadium (Davis Cup Tennis)
- Ballymore (Rugby Union)
- The Gabba (Cricket, Soccer & AFL Football)
- Kendron Wavell Service Club (Hockey Ovals)
- Noosa Foreshore (Parkland)
- Brisbane Boys College (Rugby Union & Cricket)
- The Southport School (Rugby Union & Soccer)
- Sanctuary Cove Palms & Pine Courses
- Brookwater Golf Course (Greg Norman Design)
- The Glades Golf Course (Greg Norman Design)

LEGEND

Legend Couch is regarded as one of the most versatile and attractive grasses available. It's remarkable colour retention and wear tolerance make it well suited to all turfgrass applications.

SEA ISLE

In late 2002, we introduce the revolutionary turf product SeaIsle tolerates a wide range of water resources (potable, saline and variable quality recycled water), as well as poor quality soils. The maintenance costs are less than that for bermudagrass, and its leaf texture, quality, and traffic tolerance make it an excellent all-round turf type.

Contact:

- Head Office PH:(07) 3273 1166
- John Powell - General Manager, ESP MOB:0411 635 345
- Greg Lawrence - Sales Manager MOB:0413 122 066 www.jimboombaturf.com.au

Exhibit # 86 - John Deere

This year, visit the John Deere stand, number 86 and take part in the John Deere Hole in One competition, which will be held on both Tuesday & Wednesday of the trade show. There will be some great prizes available. You can also collect your entry form for your local John Deere TeamChampionship event where your team will play for the chance to progress tothe National final held at The Glades on the Gold Coast all expenses paid,and then the World Team championship to be held in Scottsdale, Arizona, USA.

The all-new B Series walk-behind greens mowers will also be making their first appearance in the country, and you can learn about the exciting new JD Parts online parts ordering system available later in the year. All John Deere dealers will be represented so come along and have a chat to your local John Deere dealer representative, John Deere company personnel, or staff from the John Deere Turf Care factory in North Carolina.

We look forward to seeing you at the AGCSA Conference and Tradeshow once again in 2002.

Exhibit # 3 + 4 JSB - Gianni Ferrari

Gianni Ferrari Australia is exhibiting a range of grounds maintenance machinery at the Australian Turfgrass Conference. Nine models are in Australian with two new models eminent this year.

Gianni Ferrari SRL invented the original Ferrari tractor and ventured into commercial mowers in the late eighties. The first models were sold here as a generic during 1995.

Year 2000, Gianni Ferrari changed distribution agreements to allow a much larger range of machines and attachments in Australia. Gianni Ferrari has a seven year history with Australia and John Bird, Director of JSB Equipment Pty Ltd. Among the many products available, we have the new turbo 4 multi purpose mower. Made in Europe, the tractor has a unique electronic range shift and traction control system to allow the four wheel drive system to turn without scuffing. Front and rear differentials with two hydraulic drive motors provide plenty of pumping power. The absence of a PTO shaft between front and rear diffs allows a much lower centre of gravity. Many attachments can be added without tools and include rotary mowers, cylinder mowers, chippers, road vac. Sweepers, scarifiers and flails. *Visit our booth to determine the location of your local dealer.*

Exhibit # 30 - Loksand

If you really want to repair those high wear areas on your course, then come and talk to us about Loksand. Loksand has been used successfully in a number of golf course situations for repairing collapsed bunker faces, worn pathways, building new and existing tees and tired buggy tracks.

Here are just some of the courses that have benefited with Loksand.

MELB	Riversdale	Churchill Park	Freeway
	Commonwealth	St Andrews	Royal Melbourne
	Albert Park	Spring Valley	Sanctuary Lakes
ADEL	Riverside	Grange	
SYD	Elanora	Pennant Hills	
QLD	Carbrook	Parkwood	
NZ	Auckland	Remuera	Kaiapol

Visit the Loksand stand and talk with the on site licensees about YOUR particular course needs and ways Loksand can aid you in a successful outcome:

WA	Ray Hind of Hind Sands	0419 916 716
QLD	David Burrup	0418 724 923
NSW/ACT	Gary Beehag of M.Collins & Sons	(02) 9774 1544
VIC	Bruce Duper of Burdett Nominees	0418 396 771
SA	Chris Abble of Peat Soil's	0419 310 441
TAS	Erik Rolle of Southern Turf	0418 126 710

David Lovegrove from Loksand NZ will also be on site or you can e-mail him with your needs on: loksand@ihug.co.nz or call on NZ mobile of 0011 64 211459733. www.drakeextrusionuk.com

LOKSAND- THE STABILIZING INFLUENCE.

Exhibit # 37 - Nutri-Gro Biotechnologies Pty Ltd

What is Nutri-Gro? Nutri-Gro is a unique blend of Natural Organic materials, which produces extraordinary results in turf. A unique product scientifically produced and tested and guaranteed by NRA registration. Nutri-Gro is a blend of organic material i.e. chicken manure, fish waste, palm and coconut oil as surfactants and natural oils as preservatives, the total combination of these produces Nutri-Gro's unique insecticidal qualities. No other product in the market place offers this unique combination of ingredients. Nutri-Gro is unique. Nutri-Gro is a registered NRA product. Nutri-Gro has world wide patents. What is the secret of Nutri-Gro? The scientific discovery that the ingredients of Nutri-Gro kill all the bad bacteria such as E.

Coli and Golden Staph without preventing the culturing of beneficial bacteria in the formulation enables us to present:

1 x Nitrogen fixer

2 x Plant disease antagonists

2 x Biological accelerators of organic recycling working in the ground to produce turf with extraordinary growth and plant health.

What other product offers you these benefits?

- 3 IN 1 ACTION
- COMPLETE SAFETY TO STAFF AND PLAYERS
- ELIMINATION OF SAFETY GEAR
- TIME SAVED IN CLEAN UP AND SUIT UP
- NO CLEAN UP TOXICITY PROBLEMS
- HUGE COST SAVINGS

Exhibit # 79 - Nuturf Pty Ltd.

Nuturf Pty Ltd. is the largest supplier of fertilisers, pest management products, water management products, seed and general hardware to the Australian Golf Course Superintendent. Nuturf supports sales and distribution facilities in every Australian State and Territory enabling every Australian Superintendent access to the latest Turf Management technology. Your local Nuturf Territory Manager is an experienced turf professional, well trained in all aspects of turf management. Nuturf markets some the worlds leading Turf Management brands including Lesco, Aquatrols, Becker Underwood, Syngenta, Tessenderlo Kerley, Heritage Seeds and Aventis. In combination with excellent products the Nuturf customer receives unmatched technical support via an in-house technical services team. Nuturf also conducts more soil tests and other diagnostic and analytical services than any other organisation in the country. *So while visiting the Trade Show, be sure you drop in and visit Nuturf. We know it will be a rewarding experience and you never know who you might meet.*

Exhibit #38+41 - Parklands Trading Company

Parklands Trading Company Pty. Ltd. is a family owned and operated business, proud of the distinction of having been judged one of the top 500 private companies in NSW.

As both manufacturers, and national distributors of powered Lawn and Garden products, *Parklands* distribute the multi-purpose AMAZONE Groundkeepers. With unique "no-tool quick-change" blades, these multi-purpose machines are capable of scarifying, mowing and vacuuming either separately or simultaneously. Offering a wide range of cutting widths, and fitting most tractors, AMAZONE is *"the machine for all seasons"*.

Parklands introduced the first brushcutters to Australia nearly 35 years ago. Today the *Tanaka* line-up has expanded to include Brushcutters, Lawn edgers, Hedge trimmers, Chainsaws, Extended reach Pruners and Hedge trimmers, Portable Augers, Pumps, Engine Drills and Cut-off Saws, built for both Homeowners and Professionals. *Tanaka* is tough and reliable.

Also distributed by *Parklands* ... Oleo-Mac Europe's best range of Chainsaws, Cut-off saws, Pumps, Brushcutters, Hedge trimmers, Portable Augers and Mister-Blowers, offers alternatives not encompassed by the *Tanaka* range. *Grasshopper* zero turn out front and mid-mount, petrol and diesel mowers have recently joined our product range, with enthusiastic interest from all corners of the marketplace. Offering a unique mowing style, with easy maintenance interchangeable 44" to 72" flipdecks, *Grasshopper* mowers are ideal for intricate mowing as well as large areas.

Exhibit # 46 - Plateau Couchgrass

"Plateau" Couchgrass is a relatively new variety within the Turfgrass Industry. This exciting new hybrid offers unique and exceptional characteristics, the most notable being its

lateral growth habit. All initiated growth from the nodes is almost horizontal with the leaves also laying prostrate and presenting maximum surface area to the light. The lack of upright growth significantly reduces the mowing frequency of "Plateau" without compromising turf quality. Scalping is for the most part eliminated, particularly in peak growth periods. "Plateau" directs much of its growth energy into its superior rhizome and stolen growth and it comes as on surprise that turf managers are commenting on its superior recovery rates from wear and tear, and divot damage.

"Plateau" Couchgrass is also blessed with exceptional colour – its natural deep rich green contrasts distinctly against other Couchgrass varieties. D.P.I. Testing has confirmed that "Plateau" will produce good turf quality in up to 60% shade, making it an outstanding exception to other Cynodon spp. With all these exceptional attributes, it is no wonder that "Plateau" Couchgrass is winning fans wherever it has been installed. Cleveland Turf Supplies is proud to be the exclusive distributor for "Plateau" Couchgrass in S.E Queensland. *Be sure to drop into the display and discover this remarkable Couchgrass for yourself.*

Exhibit 70 - R & R Fumigation Services Pty Ltd

R&R Fumigation & Spraying Services Pty Ltd is a Victorian based company specialising in the supply and application of a range of products including fumigants, insecticides, herbicides, fertilizers, etc, to the turf industry. Most turf managers would be familiar with Methyl bromide as the most commonly used fumigant in turf and should be aware of its phasing out, due for completion in 2005.

In our search for a replacement we kept coming back to a product that is not new, but little has been done to develop and therefore, understand it's potential for use in turf. We have in Basamid Granular a product that cannot only meet most, if not all; current uses for Methyl Bromide, but has a much wider appeal as a herbicide or renovation aid. Basamid Granular is registered in turf for the control of wide range of weed and weed seeds, insects, fungi, and nematodes. R&R Fumigation Services together with BASF are committed to a R&D program that will ensure we provide the Australian Turf market with the best and most complete Basamid service available.

Basamid Granular can be safely incorporated into any renovation or construction program, used for spot application, all with spectacular results.

Exhibit #78 - Rain Bird Golf (Australia)

For more than 65 years, Rain Bird® has been a leader in the irrigation industry. From cutting-edge products such as the Cirrus™ central control system to the development of the wireless rotor, Rain Bird's Golf Division manufactures products that can be found on golf courses in more than 130 countries on six continents. Headquarters in Azusa, Calif., the Golf Division highlights it's commitment to resource management and conservation through advanced product design as well as ongoing sponsorship of the Environmental Leaders in Golf Awards. These awards salute the exemplary work being done by superintendents to preserve, conserve and protect natural resources. Rain Bird is committed to the "Intelligent Use of Water" and believes its legacy is to design and manufacture only those products that provide value and meet strict quality standards.

The Golf Division's newest products include the FREEDOM-Pad™ handheld remote control system, which provides real-time irrigation operation through map-based system compatibility. Rain Bird also manufactures the EAGLE™ 1100/1150 rotor, the longest throwing rotor in the industry, and continues development of the wireless rotor. Once launched, the wireless rotor will be the industry's first rotor to communicate from a central control, handheld unit or satellite controllers without the use of underground wiring.

Rain Bird products are sold worldwide through an extensive network of contractors and dealers. For additional information, visit www.rainbird.com or contact your local Rain bird representative.

Exhibit # 76 - Redexim-Charterhouse

Several of the Verti-Drain models on the stand could be witnessed on TV at the World Cup Soccer in Korea/Japan, taking place at the same time. The Verti-Drains are applied in the stadiums between matches. Several new items are introduced. The range of Rink top dressers apply sand either via a precise brush or via 2 disks for wide spreading.
The new range of Verti-Core aerators allow for a fast and precise coring of your turf areas. A full range of over seeders is shown, form slit seeders (Verti-Seed) to drop seeders into spiked holes (Pro seed). The new Turf Tidy is an ideal machine to sweep and scarify the turf, and can also be applied on your green. The Turf Tidy follows steep ground contours exactly due to its floating head.

Exhibit # 47+48 - Scotts

The Scotts Company is the world's leading manufacturer of products for turfgrass and horticultural professionals, offering a wide range of controlled and slow release fertiliser technologies, proprietary turfgrass seed, unique plant protection products and specialised spreading equipment throughout the world. Scotts Australia welcomes golf superintendents and turf managers to our stand and also to the stands of our distribution partners.

This year, make sure you update yourself on our new and exciting product developments, including Sierrablen®, Hydradlo® and MaxGuard®. Scotts are the only major manufacturer in their category who has a home base in Australia. With a long history of innovation in turf product technology, Scotts will use this conference to communicate our ongoing commitment to the industry, incorporating an historical theme with an overview of the new Sierra product range, which includes exciting new products.

Note that the 'Superintendent's Touch Football Challenge' is on Tuesday night, under lights at the GABBA - all are welcome. This is a great chance to clear your head and meet your colleagues over a good-natured challenge. Whether you play or not, we hope you can come along. Products for professional turfgrass managers.

Exhibit # 72-75 - Silvan Pumps and Sprayers

Silvan is a specialist manufacturing company with world-leading expertise in crop protection and related equipment. Silvan Pumps & Sprayers (Aust.) Pty. Ltd. comprises three product divisions: Silvan Spraying, SELECTA Merchandise Accessories and AgriPOWER Farm Machinery. Established in 1962, Silvan has been a pioneer in the development and manufacture of agricultural machinery equipment to meet the needs of Australia's primary producers. Always at the forefront in the development of new technology, Silvan combines strong innovative management with a comprehensive understanding of today's agribusiness.

A leader in the design of high volume, low volume and electrostatic sprayers, Silvan has a reputation for producing world class products, and has grown to become the largest Australasian manufacturer of crop protection equipment. Specialised equipment has been developed for crops including vegetables, grapes, apples, pears, citrus, wheat, and cotton, as well as for pastures and turf. Silvan's product range also includes a complete range of application equipment for the home gardener, nurseries, golf courses and sports fields, as well as world leading farm machinery products such as Nobili, Maschio, Gaspardo and Sitrex. An Australian owned company, its head office, administration, research and development, and manufacturing operations are located on a 3 hectare site in the Melbourne suburb of Wantirna South.

Exhibit # 87 – StrathAyr SportsTurf Team

The Australian members of the StrathAyr International SportsTurf Team are exhibiting together in Brisbane:

- *Jimboomba Turf Group, Brisbane*
- *Turfgrass Queensland, Mckay*
- *Tropical Lawns, Cairns*
- *Lowlands Lawn Turf, Sydney*
- *M Collins & Sons, Sydney*
- *Tarcoola Turf, Wagga Wagga*
- *StrathAyr Turf Systems, Melbourne*

Together we provide turfgrass solutions Australia wide. The Team is demonstrating a number of innovative turfgrass products including:

- BAyr Root Turf – soil free turf
- StrathAyr ModulAyr System – used for the Davis Cup final, Melbourne & Reliant Stadium, Houston
- Legend couch – the couch of the new millennium
- Stayturf – natural erosion control
- MegAyr Turf – fast, efficient, turf replacement

We look forward to meeting with you and discussing your turfgrass needs.

Exhibit # 81 - Turf & Irrigation

Turf & Irrigation has long been regarded as a specialist leader in the supply of quality irrigation and turf products to the turf amenity market. With 22 shops nationwide and 14 technically trained sales representatives, T & I has the ability to provide our customers with the latest in turf technology.

We have direct distribution arrangements with market leaders, Chipco and Scotts, along with our well-established home branded product range of fertilisers, soil conditioners, wetting agents, chemicals and turf seed. T & I has long been a large supplier of turf seed to the domestic and commercial markets. Prominent leading varieties include Sunbright Perennial Ryegrass, Statesman Tall Fescue and Sydney Couch.

Rainbird irrigation equipment also features prominently in our product range in both the commercial turf and golf irrigation markets. Water aeration equipment to compliment our wide irrigation range has also recently been introduced with great success.
T & I continues to develop and expand its product range, based on market research and the changing trends of today's turf market.

For any enquires please call your local showroom on 132 009, e-mail sales@t-i.com.au or visit our web-site www.t-i.com.au.

Exhibit # 85 - Textron Turfcare Group

The new Jacobsen AR2500 Fine-cut rotary will be released at this year's conference. This is the rotary that delivers a reel-like quality of cut but retains durability and serviceability of a rotary. It has (5) 55.9cm ground contouring decks, each with a large 7.6cm rear roller giving the ability to stripe. Whilst steering heads ensure there is no sideways sliding of the cutting decks. Parallel series 4-wheel drive delivers enviable climbing ability on this unit. Another new product will be the Cushman Commander run-a-about truckster available in both petrol and electric with head, tail and brake lights standard. This versatile unit is sure to appeal.

Exhibit #49 - The Ohio State University

The Ohio State University in Columbus Ohio USA in conjunction with various TAFE colleges in Australia, including Grovely in Brisbane have been recruiting turfgrass trainees from Australia and New Zealand for over twenty years. We will be in attendance at the 18th Turfgrass Conference at booth 49 to advise and recruit potential turfgrass trainees who are single, drug free, between the ages of 19 and 28 and are willing to commit to a year in the states. Candidates must have a clean drivers licence and be willing to take a drug test upon arrival. All expenses will be recouped due to the fact that all positions are paid well above minimum wage in US dollars. Housing, meals and uniforms are provided in most cases. We have an excellent choice of warm season and cool season courses.

The university staff will give assistance with VISAS and health insurance. Opportunities to attend short courses/take classes at Ohio State University are available to all who are qualified/interested during the internship. Past students have gone on to gain excellent job opportunities both in Australia, Asia and Europe. Stop by and talk with Mike O'Keeffe and past student David Goldie at booth #49

Exhibit # 6 - Toyota Motor Corporation Australia Industrial Equipment Division

You knew Toyota made a great range of passenger and commercial vehicles, but were you aware that they also manufacture and sell high-quality earthmoving equipment? Whilst at Turf 2002, don't forget to visit Toyota. On display will be Toyota's popular range of "Huski" Skid Steer Loaders, which range from 270kg up to a powerful 820kg-operating load SAE. Toyota's most popular Skid Steer Loaders is the 4SDK8, which is also one of the most powerful machines in it class. The Huski 4SDK8 standard features include heavy duty chassis and boom arm construction, a small tail swing for better manoeuvrability, a tilt-up cabin for easy maintenance, plus the best ground clearance in its class. Key productivity features of the Toyota Huski 4SDK8 include its power and lifting capacity – a 650kg safe operating load (with standard bucket). So whether

you're moving dirt or moving the earth, go with the name you know and trust: Toyota.

For further information about Toyota Huski Skid Steer Loaders, contact Jock Scott at Skid Steer Toyota on (02) 4577 3733, or free-call 1800 425 438; alternatively visit the Toyota Industrial Equipment web-site at http://industrial.toyota.com.au

Exhibit # 84 - Toro

IRRIGATION DIVISION

Toro extends the lead with new technology. 800 Series Sprinklers combines innovation with 700 Series' proven reliability. Unlike others, inner assemblies are compatible with older models. The solenoid halves power use and triples surge resistance. Gemini Trident – Easy and affordable. Two and three wire decoders with just the features you need. Program from your map or two main screens.

National Support Network – See Bruce McNeillly about this unrivalled service.

Real Solutions – Our range and expertise finds your preferred system, not ours. Courses demand different designs and control. Satellites suit some, radio or decoders suit others. Toro is the only company proven with every option - and all use Site Pro.

COMMERCIAL EQUIPMENT

Groundsmaster® 4500 / 4700 The new Toro Groundsmaster® 4500-D boasts a 60 horsepower turbo - charged diesel engine powering five Contour™ Plus decks that cut a 9' swath through your toughest conditions, and its rear rollers provide flawless striping! For even more productivity there is the new Groundsmaster® 4700-D with two additional decks for a 12.5' cut. Debris Blower 400/600/800 The Toro Debris Blowers generate incredible wind power to quickly clear large areas of debris. With three models to choose from, Toro has a Debris Blower to meet your specific needs.

Versa - Vac™ The Toro Versa-Vac™ tackles debris management challenges to meet your collection needs.

A large capacity hopper makes even the biggest clean-up job simple and the innovative design allows for quick deck changes and removal for servicing.

Exhibit # 68 - Trelleborg Wheel Systems

Trelleborg Wheel Systems has been manufacturing tyres since 1897. Since 1960 Trelleborg started to manufacture and supply a range of specialized low ground pressure tyres and matching rims for turf, forest and farm machines, forklift trucks and equipment. Trelleborg tyres are tailor made for Turf Applications, these are the best low speed tyres for use in lawn, garden, golf, tillager and utility equipment. Production of both tyres and rims within the Trelleborg Group allows us to provide comprehensive service to both the OEM and replacement markets. As demand for turf professionals has increased, Trelleborg has responded by developing tyres which combine a wide contact area with high durability and tread patterns which deliver superb grip without damaging valuable turf.

Exhibit #8 - Tru-Turf

Tru-Turf are the proud Australian designers and manufacturers of the most user friendly golf green rollers in the world. Consisting of two dedicated ride on mowers, the GR39 Standard model and the RS48 Roll 'n' Slice model, both with a simple built in trailer system. We also produce the Roll 'n' Slice Triple Heads that are designed to use on the John Deere, Jacobsen and Toro Triplex greens mowers. These units will roll only or roll 'n' slice to a depth of 30 mm full setting or 20mm half setting. Relatively new, is the walk behind greens mower trailer; this unique and patented trailer will transport your precision greens mower from green to green; no more rough rides as the trailer has springs; no more cut height differences from green to green, there is nothing in contact with the cutting head; no more loading difficulties, the trailer tilts to load; lowers the mower gently to the ground by hydraulics. Service, backlap and store on the trailer. Need to move more than one mower at a time, simply keep connecting the trailers together, using our dual trailer system. *See you on Stand 8 at the Brisbane Trade Show.*

Exhibit #34 - Turf Force

Turf Force established itself through commercial landscapers and display homes in new residential estates. Working with civil engineering companies and associating with leading residential developments. Turf force is a young and growing company working together with our clients for the mutual satisfaction and appeal of the project. New grasses to be displayed at show will include Saltine, Velvetine and Conquest. Some of the Services we can offer include:

- Turf supplies
- Sand and Soil Supplies
- Construction: Golf Course Construction and Shaping; Sports Fields; Cricket Wickets; Domestic and Commercial Lawns; Wetlands; Irrigation installation; Laser controlled contour shaping and Drainage installation
- Lawn Area Sports Turf Renovation: Top dressing; Aeration; Scarifying; Sprigging and Fertilizing
- Supervision and project management
- Bobcat and equipment hire
- Turf Maintenance

Exhibit #44 - Turfgrass Association of Australia

The Turf Grass Association of Australia is a non-profit industry body that represents turf practitioners, curators, ground managers, superintendents and groundsmen. Our membership is also made up of industry representatives from soil, seed, instant turf and machinery suppliers. In addition we have very close links to the Victorian Cricket Association, Melbourne University and TAFE colleges which offer education in horticultural studies. Our main objective is to offer quality personal development and educational seminars that will assist our members in keeping abreast of new developments within this specialised field, and maintain awareness of industry standards and safety guidelines. Now in our thirteenth year we feel that our association is meeting its Aims & Objectives, and through our quarterly newsletter and various publications, keeping our members informed and up to date. We look forward to greeting anyone with an interest in turf at our stand during the 18th Australian Turfgrass Conference. We are a member driven association, therefore Committee persons will be on hand to chat and take any suggestions on how we can improve our services to our entire membership.

Exhibit # 91 - Turf Link Australia Pty Ltd

Australian distributor for Ty-Crop material handling/top dressing machinery & Lastec "Articulator" mowers.

This years conference features the release of the all NEW Ty-Crop ProPass 180 LOW IMPACT Broadcast Top dresser. Designed for frequent dusting applications the ProPass offers no compaction, no tire marks, accurate and precise spreading performance. *Visit our stand and meet and discuss your top dressing and specialist "non scalping" mowing needs with Turf Link's sales staff.*

Mike Pauna, Turf Link Australia Pty Ltd, mpauna@turflink.com.au

Exhibit #69 - TurfCraft International

Editor, Alastair Dowie, and advertising manager, Ed Kryskow, will be attending this year's conference and welcome all delegates to visit the TurfCraft stand for a chat. TurfCraft columnists include turf breeder and renowned expert, Peter McMaugh; former golf course superintendent, David Nickson; irrigation design expert, Paul Jones; turf breeder and bowling green expert, Rod Riley; and United States PGATour head agronomist, Jon Scott. As well as expert columnists, each issue of TurfCraft includes stories from turf managers from each sector discussing how they maintain their own piece of turf. Recent stories in TurfCraft include: Augusta – perfect every day; Gold Coast course feel the dry; False rail a vital tool at Sunshine TC; Controlling winter Fusarium; Sorting the hype from the reality; and Tropical turfgrasses in heavy shade. TurfCraft is aimed at all sectors of the turf community and also provides free space to all turf associations to promote their organisation and inform their members.

TurfCraft welcomes input from its readers so if you have any questions regarding the turf industry or issues or stories you would like to see raised in TurfCraft either call at our stand during the trade show or contact Alastair on 0418 553 282.

Exhibit # 90 - Turfmach Australia

Australian designed and manufactured machinery that was developed as a direct result of industry needs and feedback. This approach has enabled us to build a range of machinery for Scarifying, Dethatching, Aerating and Sweeping that we are very proud of. All of out machinery can be used without taking the surface out of play and still achieve the desired result. User friendly, durable, easy to service and maintain and with dealers throughout Australia Spare Parts and Service are readily available.

On display is our TR50 Turf Renovator fitted with a vacuum and our 8cu metre Ren-o-vac Hopper and a range of rotors for our quick change rotor system to help show the versatility of this machine Ie. Scarifying, Flailing, Dethatching, Sweeping and Oversowing. A few minutes and the machine can change from a Scarifier to a very efficient Sweeper Vac.

Also on display is some of our smaller equipment.

- A CD36 900mm Dethatching Unit.
- A HSB10 Debris Blower.
- A TM5 Turfmole, a machine with Oscillating Wing Keel Blades to instantly cure Compaction, Drainage and Infiltration rate problems without taking the surface out of play, complete Aeration without cleanup.

For more information on out machinery visit our web site www.turfmach.com or phone Wayne (03) 5782 0435

Exhibit #1 - Twin View Turf

Twin View Turf has established itself as one of the leaders in the Queensland Turf industry, in particular the Sports and Recreation industry. Whether a sporting field or golf course is being developed or renovated, our services, ranging from grassing to surface improvement, will fulfil you requirements. Twin View Turf had developed a strong reputation based on commitment to both quality and service. Twin View Turf was instrumental in importing TifEagle™ and TifSport™ into Australia, and holds the Australian licence for these grasses. TifEagle™ and TifSport™ have proven themselves in the United States and Australia in both field trials and practical applications. Both were bred and selected by Dr. Wayne Hanna USDA/ARS geneticist at the University of Georgia Coastal Plain Experiment Station at Tifton for their superior cold tolerance and winter colour. TifEagle™ is the premier couchgrass providing the leading surface for all sporting fields, fairways and tees. Both grasses will be on display at the Trade Show.

Twin View Turf grows a wide variety of other grasses, and supplies turf in either washed or unwashed slabs, rolls, or stolons. Specialised equipment is necessary to provide premier quality turf and service. Some of the machinery available for hiring includes; TYCROP TD460 Top dresser and MH400 belt spreader, TR50 scarifier vacuum, Vertidrain 7521 aerator.

Exhibit # 93 - Tyco Flow Control Pumping & Irrigation - Southern Cross

Southern Cross is an Australian icon in the pumping, irrigation and water supply industry with a rich 130 years of service to industrial, rural, turf and domestic customers throughout Australia and export markets.

Southern Cross manufacturers the majority of core products and their components here in Australia, at the recently relocated new facilities at Withcott. The new factory will allow future growth plus a superior level of quality and service to our customers.

Southern Cross, an experienced supplier to the golf industry, manufactures the latest generation PumpMaster integrated packaged pump systems specifically designed to handle large constant pressure applications, with many courses already taking full advantage of the latest in reliability and efficiency.

The PumpMaster demonstration unit shall be on display at the 18th annual AGCSA trade show and conference in Brisbane 18-19th June 2002, to allow superintendents too experience the PumpMaster advantage personally, and profit from special offers currently available.

Find out why PumpMaster can maximise the benefits of;

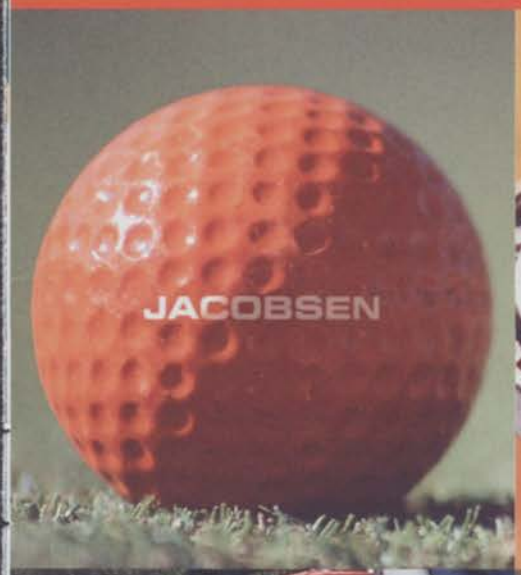
- Energy savings
- Reduce maintenance cost
- Improve water use efficiency

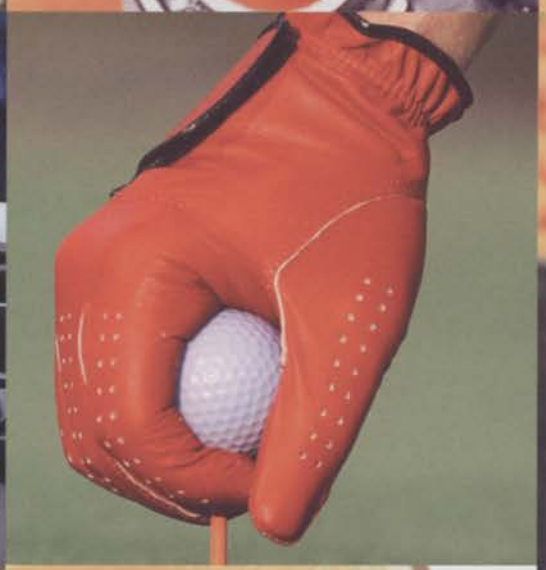
Looking followed to seeing you at the trade show, Stand 93.

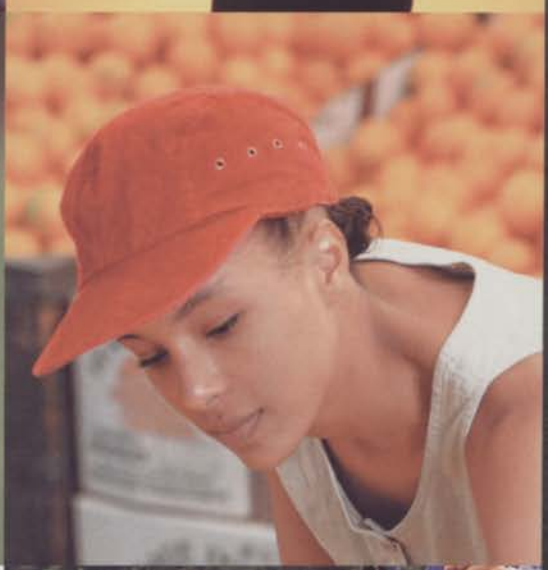
Contact details:

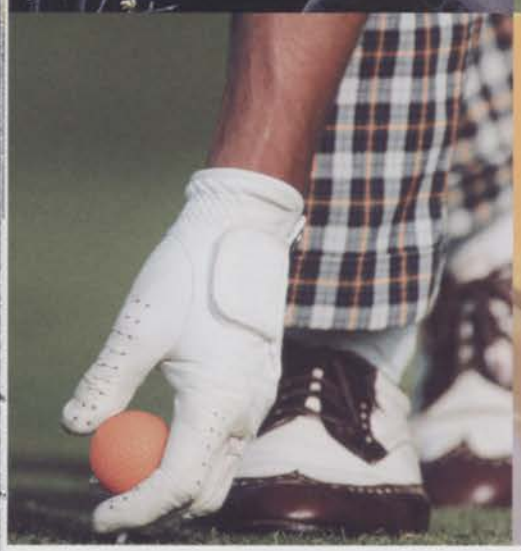
Tyco Flow Control Southern Cross: 131 786

Operations Manager – Pump Systems; Scott Johnstone: 0417 554 471









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Management of Treated Effluent Water for Turf

New effluent water holding pond at the Barwon Heads Golf Club

Recycled wastewater, which is primarily treated sewage effluent, is increasingly being used for irrigating turf. There have been a number of detailed reports (Lang et. al. 1977, GHD 1977 and NSW task force on recycledwater 1982) investigating and detailing the feasibility of reusing treated sewage effluent. A Department of Resources and Energy report in 1983 identified that in Australia the total amount of treated sewage was about 1300 gigalitres/annum of which 56 gigalitres/annum (4.4 percent) is reused in irrigation. In a survey of Queensland sewage treatment plants it was determined that about 33% of the treated effluent applied to land was used on golf courses (Bryan et.al., 1994). In Victoria, Melbourne Water are aiming for 20% reuse by 2010 and are examining the potential for reusing wastewater from existing treatment plants as well as "sewer mining" and on-site treatment. Treated wastewater is an important water resource for irrigation purposes and in the future it maybe the only source of supplemental water available for turf culture.

With greater demands on our water supplies for domestic consumption, there is less water available for irrigation purposes. However, with the increase in urban development there is not only a greater demand for potable waters but also more wastewater generated.
The treatment of this wastewater and its disposal has become a significant environmental issue. In particular, the disposal or reuse of wastewater must be done in an ecologically sustainable manner. Wastewaters can contain a range of contaminants including salts, nutrients, heavy metals, viruses and bacteria that can limit the reuse options. The use of wastewater that has a heavy contaminant load can have implications for human health, cause soil degradation and result in uncontrolled discharge of nutrients to surface and groundwaters.
The other important component of the sustainability equation is maintaining the playing quality of the turf area.

The reuse of wastewater will, in the future, be an integral part of the ecological sustainable development and integrated catchment management philosophies concerning water quality (EPA 1996). There is now strong encouragement to reuse treated wastewater for irrigation purposes in order to protect the quality of surface waters. In most states, there are environment protection policies that demand that wastewater no longer be discharged to surface waters and that it is reused. The general philosophy and in some cases legislation, demands there be no discharge of wastewater to waterways early in the new millennium. As a consequence, there are numerous reuse schemes being established around Australia to use wastewater for turf irrigation.

The reuse of wastewater has a strong community appeal and it seems to be the 'right thing to do'. However, if a reuse scheme is to be sustainable for a long period and most authorities define this as at least 50 years, then there is a lot of investigation required before the scheme is implemented. Once the scheme is implemented it must then be monitored to ensure that it is sustainable and does not present an environmental risk.

GUIDELINES FOR THE REUSE OF RECYCLED WASTEWATER

Most of the state authorities responsible for the reuse of wastewater, such as the Environment Protection Authority (EPA) and the various State Health Authorities, have in conjunction with Departments of Agriculture and Water Authorities produced guidelines for wastewater reuse. These guidelines do vary from state to state, however, the underlying philosophies are similar and most use the ANZECC (2000) water quality guidelines and the National Health and Medical Research Council and Australian Water Research Council Guidelines (1987) as their base documents.

WASTEWATER QUALITY FOR IRRIGATING TURF

The development and maintenance of a quality turf surface depends on the availability of a

good quality water supply. All irrigation waters, including wastewater, contain varying concentrations of soluble salts and other elements. These may include sodium, calcium, magnesium, potassium, chloride, bicarbonate, sulphate, boron, and nitrate. Of significant importance for wastewater use on turf areas is the nutrient content and in particular the nitrogen and phosphorus concentrations.

Some of the key constituents of recycled wastewater are as follows;

• **Salinity:** When assessing the quality of recycled wastewater, the soluble salt level is a good indicator of quality and is usually the most limiting factor. High salinity water causes an increase in soil salts and as soil salinity increases it becomes more difficult for plants to extract water from the soil.

As a general rule, recycled wastewater with salts exceeding 1000 mg/l severely limits its use on turf, however, this is dependent on grass species (also variety), soil type, thatch level and irrigation management.

• **Sodium:** Where sodium forms a large proportion of the total salts in water, soil permeability problems can occur. High concentrations of sodium in the recycledwater will increase the concentration of exchangeable sodium in the soil and as the exchangeable sodium content increases there is a breakdown in soil structure in high clay content soils. This reduces permeability, aeration, infiltration, soil workability and ultimately plant health. On sandy soils where permeability is less of a problem the cation exchange sites become saturated with Na^+ at the expense of Ca^{2+}, K^+ and Mg^{2+} the sodium is taken up by the plant in preference to these other cations. Sodium accumulation in the plant can then reach toxic concentrations, resulting in; a loss of turf vigour, low recovery potential, lower tolerance to heat stress, reduced tolerance to pests and diseases and potential death of sodium sensitive plant species. Fortunately, most turfgrass species have moderate to good tolerance to sodium and while there may be a reduction in vigour, death of the plant is unlikely.

Calcium must be applied to counteract the effects of high sodium waters, most often in the form of gypsum ($CaSO_4$). In situations where the sodium content of the water is very high and there is a need to apply large amounts of gypsum, regular small applications applied through the irrigation system are more convenient and effective than applying large, irregular applications to the turf.

• **Bicarbonate and carbonate:** Permeability problems are also related to the carbonate (CO_3^-) and bicarbonate (HCO_3^-) content in the irrigation water. When drying of the soil occurs, part of the CO_3^{2-} and HCO_3 precipitates as a $Ca\text{-}MgCO_3$, therefore removing Ca and Mg from the soil water and increasing the relative proportion of sodium. The presence of high concentrations of CO_3^{2-} and HCO_3^- can cause nutritional disturbances such as reducing the availability of calcium and the uptake of iron.

High bicarbonate waters can be treated by acidification of the irrigation water to remove the excess bicarbonate (Carrow et.al. 2000). Acid treatment systems available in Australia, inject acid into the irrigation mainline, with the quantity of acid being determined by the volume of water applied and the pH.

• **Chloride:** Sodium and chloride are the most damaging ions, with chloride being particularly toxic. Plants accumulate chloride to the

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exclusion of calcium, magnesium and potassium causing nutritional disturbances. In addition to being taken up by the plant, chloride will cause direct injury to the plant as water dries on the leaf, particularly if irrigation is undertaken during the heat of the day. However, there is significant variation in plant tolerance to chloride, enabling the selection of more tolerant plants to be used under saline conditions.

• **Nitrogen:** Nitrogen levels can be very high in wastewater and the main impact will be on grass growth. Every time the turf is irrigated it is fertilised with a soluble source of nitrogen that is readily taken up by the plant. Uncontrolled and lush growth can occur, resulting in a soft, thatchy and disease prone turf.

• **Phosphorus:** Phosphorus is another important element and applications in excess of what the soil can absorb and the plant will take up can be leached into ground and surface waters.

• **Heavy metals:** Heavy metals such as zinc, iron, copper, nickel, lead, chromium and cadmium occur in recycled water. Iron, zinc and copper are essential for healthy turf but in excessive amounts these elements are toxic. Heavy metals in recycled water can be a problem where the main source of effluent is of industrial origin, however, recycled water that is mainly of domestic origin, has a low heavy metal input which is unlikely to be toxic to turf. The ANZECC (1992) guidelines for water quality and Harivandi et.al. (1997) have published comprehensive lists of heavy metals and the recommended concentrations.

• **Boron:** Boron occurs naturally in some soils and groundwater as well as in recycled water. Boron is used in detergents and soaps and most treated effluent contains 0.5 to 1.0 mg/l of boron. Boron is essential to turf growth but levels greater than 2.0 mg/l can be toxic. The effects of boron depend on plant species tolerance and soil conditions. Well drained soils that are readily leached, generally do not accumulate boron because it is a mobile element and easily leached through the soil. In general, recycled water of domestic origin does not contain toxic levels of boron.

• **Health considerations:** When dealing with treated wastewater there are health considerations that must be taken into account. All wastewaters contain varying levels of microbiological activity and potentially can be considered a health risk. All states have public health regulations governing the quality (microbiological) and use of recycled water. The regulations are generally based on the NHMRC (1980) guidelines and are designed to provide guidance to authorities, users and the general public on the conditions governing its safe use. The guidelines are designed to safeguard public health and therefore particular attention is given to microbiological quality (and not chemical).

• **Other contaminants:** Wastewater used for turf irrigation can come from non–sewage sources and knowledge of what takes place at the source will provide an indication of possible toxic elements.

When using recycled wastewater it is very important to estimate the annual nutrient load as this will have a significant effect on the fertiliser program, soil management and the health and quality of the turf. The nutrient content is an important economic consideration as well as environmental (Harivandi et.al. 1997). Even if the concentration of nutrients is relatively low, because they are applied on a regular basis, the nutrients are efficiently used by the turfgrass.

SITE EVALUATION AND MONITORING

In evaluating the feasibility of using recycled wastewater it is important to determine whether or not the system can cope with the potential nutrient and salt loads and if a long term, sustainable turf system can be maintained. **There is no point in establishing a recycling system because it seems like a good thing if in the long term it is going to result in site degradation.**

Where recycled wastewater is to be used there is usually a requirement to prepare an Environmental Management Plan (EMP) that describes the site conditions, water quality and how the system will be managed in a sustainable manner. For example, if the water is high in sodium the EMP may state that a gypsum injection system will be installed and "x" tonne/ha of gypsum will be applied.

A site assessment is essential if the EMP is to be meaningful and must look in detail at all greens, tees and fairways to determine the following conditions;

- Soil types.
- Drainage
- Salinity
- Grass Species
- Phosphorus retention
- Proximity and quality of ground and surface waters
- Topography
- Geology of the site
- Irrigation requirements
- Nutrient loads
- Ability of the site to cope with extra demands because of the waste water e.g. extra growth, runoff contaminant

Once the site assessment is completed and an irrigation program implemented, it is then necessary to initiate a monitoring program. The site assessment will identify key areas that can be used as indicators and include monitoring;

- Surface and groundwater
- Each of the major soil types
- Representative greens and tees

The monitoring program is an important method of reviewing the EMP and determining what modifications may need to be made in managing the use of the wastewater.

Recycled wastewater is a valuable resource, however, it contains nutrients, salts and other possible contaminants. For this reason a detailed site evaluation and thorough knowledge of the quality of the recycled wastewater is required so that an appropriate management strategy can be put in place.

RESEARCH PROJECT

The AGCSA, with funding from the Barwon Heads Golf Club and Horticulture Australia has established a trial at the Barwon Heads Golf Club to monitor the effects of irrigating with recycled wastewater. The project involves monitoring soil and water on the golf course as well as on a nursery green that is presently being constructed. The nursery green will have half the area irrigated with potable water and the other half with recycled wastewater. This will provide a unique opportunity to monitor the effects of salts, sodium and nutrients on soils and turf quality. This project provides an excellent opportunity to monitor a site that has not previously used recycled wastewater.

John Neylan is the Manager of AGCSATech, the Technical Services, Research and Consultancy division of the Australian Golf Course Superintendents Association (AGCSA)

Construction of a new nursery green at Barwon Heads that will be used as a test site for the recycled water

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Thinking of renovating your irrigation system? Toro's PC based Gemini/Trident control system can help. With it's two or three wire decoder technology, you can convert and upgrade your existing irrigation system to provide enhanced monitoring and control.

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- Compatible with older 2 and 3 wire decoder systems;
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For further information, contact Toro Irrigation on 1300 130 898.

GROUNDSMASTER" 4500 / 4700

The new Toro Groundsmaster 4500-D combines the superior cut you expect with the power you need. Its 60 horsepower turbo - charged diesel engine powers five Contour™ Plus decks that cut a 9' swath through your toughest conditions, and its rear rollers provide flawless striping! For even more productivity there is the new Groundsmaster 4700-D with two additional decks for a 12.5' cut.

For further information, contact Toro Commercial on 1800 356 372

TORO

THE LIGHEST WALK BEHIND GREENSMOWERS ON THE MARKET

Designed with the operator in mind, the B Series is the result of intense customer feedback and industry research. The lightest mowers on the market today, the three models feature true 18-, 22- and 26-inch frames that allow the operator to follow cut lines and overlap with increased accuracy.

A redesigned handlebar not only adds to operator comfort, but also improved cutting performance. The handlebar now features customized height adjustment, so that every operator can set the equipment for their personal needs. By decreasing the distance between the safety bail and the handlebar, bail "flopping" during transport is eliminated, therefore increasing the life of the equipment, and, for increased strength and increased operator comfort, larger diameter tubing is installed around the handlebar.

Come to the John Deere Stand #86 at the AGCSA tradeshow in June to see these new B series walk-behind mowers first-hand. Available late 2002

JOHN DEERE

PRODUCT SHOWCASE

TORNADO TM360 DEBRIS BLOWER

Moves debris quickly, quietly and efficiently

- **Low noise levels**
- **Air flow in excess of 245kph**
- **Blast intensifier standard**
- **Heavy duty anti scalp roller**
- **Suitable for tractors 25HP+**
- **Clean 18 fairways in around 4 hours**

The New TM360 Tornado Debris Blower will suit any turf manager who needs to move debris quickly, quietly and efficiently.

The Tornado TM360 moves air in excess of 245kph, and with standard blast intensifier, enables you to divert air flow to where you require it, removing the most stubborn material from fairways, tees, roughs, cart paths, car parks and general turf areas.

Most importantly the Tornado TM360 is the quietest debris blower on the market, enabling its use without complaint in the most built up of residential areas.

ASPAC Golf & Turf

For further information on the TM360

Free call 1800 640 305

ASPAC Golf and Turf PO Box 23 Hallam VIC 3803 Ph 03 9796 4254 Fax 03 9708 6702

CHIPCO LAUNCHES NEW BROADLEAF HERBICIDE

At last the wait is over, Chipco" is now ready to introduce their much anticipated new herbicide. Chipco SpearheadTM will be launched at the 18th Australian Turfgrass conference in Brisbane in June this year.

Chipco Spearhead has a unique position in the Australian turf market; it combines new chemistry with good environmental positioning and effective broad spectrum weed control.

What does it offer you?

- Broad spectrum broadleaf weed control, including key weeds such as creeping oxalis (Oxalis corniculata), plantain (Plantago lanceolata), white clover (Trifolium repens), cats ear (Hypochoeris radicata) and capeweed (Arctotheca calendula).
- Safety on an extensive number of turf species such as Queensland Blue Couch, common and hybrid couchgrass and all cool season species. It is also safe on kikuyu and buffalo, some transient discolouration may be observed on certain varieties of buffalo.
- Unique mix of three effective active ingredients that offer a combination of leaf, shoot and root uptake and may offer extended weed control for a number of weeks
- Reduced volatilisation risk, which gives you the freedom to use Chipco Spearhead in sensitive areas including the ester exclusion zones in Victoria and the key viticultural areas around Australia.

These benefits combine to give a herbicide that offers much more than anything else on the market. The Chipco team will all be present at the Turfgrass conference in June, so call in and have a chat about Chipco Spearhead.

For further details, please contact Chipco on (03) 9248 6888.

Chipco

A NEW WEAPON IN THE WAR AGAINST DISEASE!

With the ever-increasing demands for perfect turf, turf managers need products that they can rely on. Colin Campbell Chemicals has just released IPPON 500 AQUAFLO for this very purpose.

IPPON is a broad-spectrum systemic fungicide containing 500g/L iprodione. It is registered for use on brown patch, black and white helmo, fusarium, spring dead spot, leaf spot and dollar spot.

IPPON is a preventative and curative fungicide that affects all phases of fungal development including spore development, mycelium growth and the development and production of spore producing organs. IPPON is fast acting, long lasting and is ideal to fit into your spray program all year round.

Ippon is a Group B Fungicide fitting nicely in to the already wide (with multiple fungicide resistance groups) range of Campbell fungicides.

For further information contact Colin Campbell Chemicals on (02) 9725 2544 or email us at cccsyd@campbellchemicals.com.au

Campbell

PRODUCT SHOWCASE

Dakota Turf Tender 410

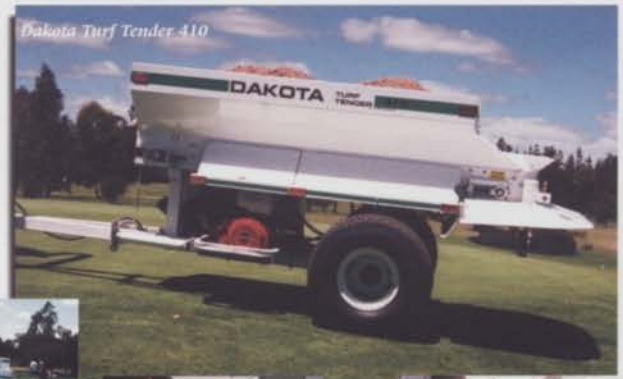
The ultimate greens dusting, topdressing AND fertilising system

- 8 Metre throw allows 2 pass greens dusting
- Can apply material up to 12mm thick, no need for brush
- Can adjust spinner and belt speed from operators seat
- Applys wet materials without bridging or clogging
- Converts in under 2 minutes to fertiliser spreader
- Can apply sand, fertiliser, dynamic lifter, couch stolons and more

Many machines claim to be versatile but only the Dakota Turf Tender 410 offers it all.

The Turf Tender 410 is as profficient lightly dusting greens, as it is applying heavy topdressings to tees and surrounds, and in under two minutes converts to one of the most impressive fertiliser spreaders you will ever see.

The Turf Tender 410 features an 11HP Honda Engine, easy fill hopper, special Dakota 'bucket' belting and much more.



Dakota Turf Tender 410

Fantastic for green Dusting

Quick Release Fertilis Spinners

Applying Dynamic Lifter

ASPAC Golf & Turf

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For further information on the Dakota Turf Tender 410 including CD Rom | **Free call 1800 640 305**

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TURF MANAGEMENT AND THE TRAINING PACKAGE REVIEW

Work is in its final stages of the review of the current Horticulture Training Package. There will be a number of changes that will be of interest to the turf industry.

The title of the training package will now be the 'Amenity Horticulture Training Package' to differentiate it from production horticulture (which is now covered under the separate 'Rural Production' Training Package).

Turf qualifications will also see some changes.

- There will be a general Advanced Diploma in Horticulture to cover all amenity sectors including turf management. That is, there will no longer be a specific Advanced Diploma for turf.
- The Diploma of Horticulture for turf will require eight units to be completed at that level (compared with five in the current training package). This will not impact on the current requirements for a diploma under the AGCSA Skills Recognition Program.
- Qualifications above trade level (level 3) will not have prescribed 'core' units. This will increase the flexibility of the package.

Overall however, the turf component of the Amenity Horticulture Training Package will be an improvement on the content, structure and relevance of the current package and will provide better guidelines on training and assessment in turf management across the country.

AGCSA and other turf industry representatives have been involved in consultation on this training package, and will be involved in a final 'sign-off' as part of the formal endorsement process.

For further information and to provide feedback, visit www.rtca.com.au for the latest updates and details.

AGRI PACIFIC NAMED AS DISTRIBUTOR FOR FCI

Full Coverage Irrigation has named Agri Pacific, Inc the exclusive distributor of FCI's high performance retrofit sprinkler nozzles in several areas outside the US market and in the state of Hawaii. Agri Pacific will distribute nozzles in the countries and regions of: Argentine, Australia, Bahrain, Brazil, Brunei, Cambodia, Chile, Costa Rica, Egypt, Figi, Guam, Hawaii USA, Hong Kong, India, Indonesia, Japan, Malaysia, New Zealand, Northern Mariana Islands, Oman, Peru, Philippines, Republic of China, Saudi Arabia, Singapore, South Africa, South Korea, Taiwan R.O.C., Thailand, Turkey, United Arab Emirates, Venezuela and Vietnam.

For additional information call FCI at 877-658-3072 or visit www.fcinozzles.com

TURF PRODUCERS COME TOGETHER

On Monday 11th March 2002 in the Barossa Valley on the deliberation of a three-day seminar, an historical inauguration of a National Association of Turf Growers was formed.

Called "Turf Producers Australia" - TPA was instigated by the N.S.W. Turf Growers Association, who formulated a strong body of thirty four members from six states established the first Australian Board of Directors to lead the way to better the ever growing turf industry under the one banner.

This body agreed to: -

- Provide industry representation as a principal advisory body for turf producers (and allied bodies)
- Encourage best practice in the Industry and provide a forum for industry members and allies.
- Form a code of practice to guide the members to provide the best practice.
- To promote best practice in turf growing.
- Maintain environmental values.
- Represent member industry in dealing with local, state and federal Government agencies, including international representation.
- Encourage direct education and research to benefit the industry and community.

For further information and membership applications, please contact Secretary – Ray Moir (08) 93320541 or raymoir@bigpond.com

SEED RESEARCH OF OREGON ESTABLISHES DIRECT SALES AND SERVICE CENTER IN AUSTRALIA

Seed Research of Oregon (SRO) have established a direct sales and service center in Melbourne Australia, to directly advise, market and sell the companies comprehensive range of turfgrass cultivars.

Seed Research own and operate the worlds largest turfgrass breeding and research program and according to company President, Mr Mike Robinson, the opening of the companies first sales and service center outside the USA has exciting prospects for the company and Australian turf managers.

"Our company is best known for our bentgrasses, SR1020, SR1019, SR1119 and Dominant, but they are just a small representation of a large and interesting portfolio of grasses, including completely new species we have been developing for turf, such as SR6000 Deschampsia Cespitosa, Warm season grasses and of course constant updating of traditional turfgrasses such as Ryegrass and Tall Fescue.

Activities in Australia will give our clients direct access to our research staff, new varieties and species, and as we will supply the market with our products direct, clients should see a real purchasing advantage.

The Seed Research sales center has been fully operational since January 1st 2002 has large stockholdings of Poa Free , Greens Quality and Sod Quality turfgrasses and has blending/bagging facilities for clients requiring special blends.

Seed Research operations in Australia will be headed by Mr Martin Eade in an agreement that will see Seed Research Australia trade as adivision of ASPAC Golf and Turf.

"Martin 'Eade on Seed' was the public face of Seed Research in the late 80s and early 90s and has had continual involvement with Seed Research and our products for the past 14 years" said Mr Robinson, "and as usual he has some very creative ideas about how we can position the company and our products".

Seed Research can be contacted on freecall 1800 640 305, by fax at 03 9708 6702 and via the Internet at www.sroseed.com

NEW HOME FOR AGCSA

The AGCSA has moved to new premises. Our new contact details are as follows:

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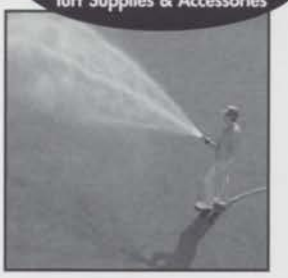

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GCSAQ

While some courses have seen a bit of rain, things in Queensland are generally on the look out for a bit more rain. The Gold Coast Council is chasing up water poachers and late night garden sprinkler users with a squad of water inspectors as the Russ Hinze Dam gets below the 50% level. The few decent storms that have been through have not put much into the storage at all.

While this goes on the state of many Queensland courses is better than ever with the dry conditions meaning reduced fungal activity and days lost to rain. The Queensland Golf Union has finished it's report on Ectotrophic Root Infecting Fungi believed to play a role in summer decline. It's report makes interesting reading and should be widely available soon.

The AGCSA traveling workshop session at Indooroopilly Golf Club was very successful with Jim Moore providing plenty of food for thought.

As everyone is flat out and busy I will wish you all well, we are all preparing to host the 18th Australian Turfgrass Conference at the Brisbane Convention Centre we and hope to see plenty of you up here to enjoy the sunny weather.

Jon Penberthy
President, GCSAQ

GCSAWA

The weather here in the west is still misbehaving and at the time of writing no rainfall has been recorded in April. Everyone here is hoping we get some significant rain during the winter to avoid serious consequences next summer.

Jeff Lane at Gosnells is busy preparing for the WA PGA championship, the first big tournament for this rapidly improving club. I'm sure Jeff will present a fair but stern test for the players and the greens will be lightning fast as they usually are.

The State Presidents meeting held in Adelaide in April was most constructive with all states working together to push the association forward in a positive way. I personally believe there is much stronger interstate networking due to these regular State Presidents meetings. All who attended had many proactive ideas and the joint projects instigated at the last meeting are progressing well. While in Adelaide we had a sneak preview of the new Adelaide Convention Centre, the site for the 19th Australian Turfgrass Conference to be held next year. The extensions to this complex are impressive and next years event should be great.

On a sad note the industry lost one of the 'good guys' recently with the passing away of Murray James. Murray worked closely with many Superintendents on the development and construction of various implements and machines for golf course maintenance. He was a great supporter of our association and a true gentleman. Many of us are proud to have known him as a colleague and a friend. We all will sadly miss him.

Wayne Miller has resigned from the Superintendents position at Lake Karrinyup. A strong industry supporter Wayne was always willing to share his ideas with other colleagues. His presentation of Karrinyup for the recent Johnnie Walker tournament was superb and attracted complimentary remarks from many international players. We wish Wayne all the best in his future endeavours.

Round 3 of the John Deere Super Series was held at Mount Lawley. Glenn Cross presented a fabulous golf course for us on a fine autumn morning. Winner was Mark Rodoreda from Symonds Seeds who finished well for his maiden series victory.

Idris Evans at the Western Australian Golf Club has just commenced a huge project with the installation of a new irrigation system. The old system, which had been patched up several times over the last 20 years, was well overdue for a re-vamp. It was not uncommon for the staff to repair 3-4 mainline breaks in a week.

The waste audit study is proceeding well with a comprehensive questionnaire being circulated to all golf courses in the state. The data from this survey will help to quantify the amount, type and method of waste disposal from golf courses.

The GCSAWA have also been working with the Secretary Managers Association on producing a Safety Procedures Manual. With the help of the Chamber of Commerce & Industry we have now reached the point of producing a detailed document that each golf club can fine tune to their requirements. An employee safety booklet has also been produced that Superintendents can use to introduce their staff to basic safety requirements.

I look forward to meeting many old friends and also some new ones at the conference in Brisbane.

Allan Devlin
President, GCSAWA

NSWGCSA

As I write this report many superintendents in the Sydney area are into autumn renovations as the "Major Pennant" season draws to a close; it has been very much a "lottery" as to how golf courses survived or suffered in recent months, with some courses receiving their annual average rainfall already in conjunction with as many as 5 major storm events in the space of eight weeks.

Oatlands Golf Club played host to our recent golf championships and Scott Lane and his staff did a great job presenting the course under extremely difficult circumstances (its hard to cut fairways with 70 ancient Eucalyptus pilularis in the horizontal position).

Jack Newton was our guest speaker and gave a very interesting account of his career both before and after his famous accident. It was a privilege to play golf with Jack and he hit some shots with "one arm" that put a "bloody lot of pressure" on his able bodied playing partner.

Congratulations to Trevor Ridge (Sawtell) who successfully defended his title with a fine 71 off the stick and is our champion for 2002.

The Coveted Rube Walkerton Trophy was won by David Somerville R.A.E. with 39 points off a handicap of 4.

Winner of the Patons Cup were Phil Goodman (Manly) and James Royal (Nuturf) with 44 points.

Other results were as follows:

- Runner-up Presidents Trophy - Andy Hugill 74 points (East Lakes)
- Runner-up Rube Walkerton - Craig wright 37 points (Cammeray)
- Assistant Super Trophy - Phil Goodman 40 points (Manly)

In a cruel twist of fate; John O'Dell (Royal Sydney) after amassing 36 points, which put him in 3rd place in the Rube Walkerton Trophy received "NOTHIN" (we didn't pay 3rd), meanwhile Tony Smith one of John's staff at Royal Sydney while failing to score a point easily picked up the "not so coveted" Bradmans.

Guy Thomas (Newcastle) was also dealt a cruel blow during the evening festivities when his elation at winning some beautiful "Waterfront Crystal" in the lucky door prize was soon replaced by disappointment when the "MC" tripped over the podium and smashed the "Waterfront Crystal" to smithereens.

Nonetheless a great day and night was enjoyed by the 80 participants; thanks to Patons for the sponsorship.

In a previous report I stated that as of 31/7/02 any person applying a pesticide must have a licence; I have since been told that there could be a "period of grace", however I would advise any Superintendent in NSW to get as many of your staff as possible accredited as soon as you can, because these days the goalposts are always changing. (Record keeping will definitely be MANDATORY by the above date).

The end of an era; with John Spencer resigning from his beloved Huntingdale, John, I know that I speak for a lot of "younger" turf people in this state when I say thankyou for your unselfish sharing of your knowledge and experience to many people over many years, I believe you showed the same affection for the industry as men like Claude Crockford, Rube Waterton, Vince Church, Reg McClaren and many more; let us hope that blokes like yourself are not a dying race.

Best of luck to all the nominees for the various awards at the upcoming conference, see you all in Brisbane.

Martyn Black
President, NSWGCSA

VGCSA

It is with a sense of responsibility and pride that I write my first report on behalf of the V.G.C.S.A.

It is my desire to continue to strengthen our association with extra initiatives put on enticing new members to join us from the rural areas. I will also encourage the new group of young superintendents now in the industry to participate

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at a Committee level, which brings with it a heightened awareness of the innovations taking place in horticulture.

On April 29th, Metropolitan Golf Club hosted the V.G.C.S.A.'s Annual General Meeting with over 110 members and guests in attendance. The day consisted of the Golf Championship, lunch, an election of office bearers and a number of guest speakers.

The golf course was presented in its usual superb condition with the weather equally comparable. The winners of the major events were Brett Balloch - Anglesea GC, the Powell Trophy - John Mansfield, David Golf - the Presidents Trophy, and the Toro Cup winner was by Paul Holmes - Yarra Yarra GC.

The guest speakers this year were put together to highlight the 75th Anniversary of the Association with John :Scarth, Author of "A round forever" discussing the input of the Morcom family to the turf industry. He also added some interesting views on the Alister McKenzie period. This was followed by a panel discussion with some notables from the past and present touching on the changes they have witnessed over the years. Our thanks to Glen Cain, Rob Cornell, Laurie Freeman, Archie Gardner, Ray Keane, Bill Kinnane, Peter Lonergan, Ben Nowell, Bill Podester, Bill Powell, Bill Ried and Peter Sawyer for their contribution to the day.

Elections were then carried out with a number of changes taking place to Committee.

The V.G.C.S.A. Committee is now made up of the following members:-

President:

Michael Picken	Riversdale Golf Club

Vice-President:

Michael Riordan	Patterson River Country Club

Treasurer:

Brett Balloch	Anglesea Golf

Secretary:

Clayton Howel	Eastern Golf Club

Committee:

Tim Pierce	Greenacres Golf Club
Chris Grumelart	Cape Schanck Resort
Mark Gahan	Dunes/13th Beach
Mark Lambourn	Moroopna Golf Club

A host of ex-presidents were in attendance

Once again, a special thanks to the Toro Company for their support of the A.G.M. Their sponsorship of this event has existed over many years, with hopefully many more to come.

Upcoming events for the diary - Secretary Managers / Superintendents Day at Barwon Heads on July 15th. Golf and a guest speaker on Insurance will be the theme of the day.

A Country meeting will follow at Shepparton GC on August 19th with an overseas speaker being considered to encourage our Country members and guests to attend.

Finally, a thank you to John Geary who has retired as President of the Association after 2 years at the helm and 8 years in total on Committee.

Enjoy a well earned rest John!

Michael Picken
President, V.G.C.S.A.

SAGCSA

After a mild summer in Adelaide, we are still waiting for rain. Most areas have only had one inch of rain in three months! With Anzac Day just around the corner, it is guaranteed to rain.

Our last meeting was held at Tea Tree Gully Golf Course on 9th April. Host Superintendent Ivan Swinstead took us on a tour of the course, showing the newly shaped and bunkered 7th hole. The topic for the day was Aquifer Storage and Recovery. With seasons changing and being the driest state in the driest continent in the world, water quality and conservation are our major concerns. Kevin Dennis from the Department for Water Resources was on hand to explain and demonstrate the operation that has been implemented at Tea Tree Gully Golf Course.

On 14th May we are having a combined bus trip for the South Australian Golf Course Superintendents Association and the Sports Turf Managers and Staff Association to Lindsay Park Stud and Tanunda Golf Course. Anyone wishing to attend can contact Bryan Cooper to arrange a spot on the bus.

As of April, SAGCSA has its own web site up and running and can be accessed through the AGCSA site. It will contain information on upcoming meetings and events involving the golf and turf industries. Any contributions would be appreciated.

A reminder – our AGM is at Glenelg Golf Course on 6th June 2002.

Shawn Standfield
President, SAGCSA

TGCSA

TGCSA members and guests were priveledged to be lectured by Dr David Huff at Mowbray Golf Club on the 2nd of April.

David's knowledge of Poa plant breeding is becoming more extensive and accepted into the turf industry.

Pure Poa green trials are being conducted in New Zealand with promising results from this particular plant breeding formulae.

Trial samples of Pao annua are also being monitored, samples taken from greens in New Zealand, South Australia, Victoria, New South Wales, Tasmania and as far as Sweden will be monitored for growth characteristics.

Robert Copper (Scotts Australia), also lectured delegates on the Scotts 'Siera' product range and their value to the turf industry.

Those who attended the day – "thank you" and thanks must also go to Dr. David Huff, Robert Cooper, Euan Laird (AGCSA) for making the day so successful.

Steve Hooper (York Park Sporting Facility), would be wrapped with the feedback given on the recent AFL game played at the park. The surface is pristine and a credit to his management skills.

Dolar Spot disease has been very active in the north of this state, with most turf managers experiencing outbreaks in the last 8 – 10 weeks.

In the south, Mark Potter (Claremont Golf Club) is continuing with his extensive Pine tee removal, which has given the course a completely new outlook. Replanting with a more suitable species to this area should be beneficial and aesthetically pleasing to all involved.

Phil Hill
President, TGCSA

TGAA (Vic)

What a wonderful summer season we have just been through. I think most of our turf managers would have enjoyed the frequent showers that occurred right when we needed them. No restrictions were imposed in the Metro Melbourne area but the triggers got really close early on.

The cricket covers had a real workout later in the week but judging by the scores in most competitions the wickets were fast and true. Well done to all for you're efforts in maintaining wonderful surfaces for all participants.

With public liability at the forefront of our local sporting clubs budgeting, it is important that we continue to be aware of potential hazards and report or fix them as soon as they are identified.

Our annual OHS Morning has the theme of 'Machinery Safety'. Risk assessments will be worked through on various pieces of equipment so we can all benefit from hearing and carrying out a risk assessment. We are looking at another very successful event and a good opportunity to meet the turf apprentices.

July 17th is the cricket wicket seminar and we have a dedicated day to wickets. We have acquired speakers that will take you through the stages of management to ensure optimum performance from your wickets. Rootzone Laboratories will discuss wicket soil selection, compatibility and soil testing results. Once your soil is right, Keith McIntyre will elaborate on issues

from his latest book "Cricket Wickets Science or Fiction". Depth of profile, Drainage of the table and Density of Turf are topics he will cover among others. Matthew Bywater is to present a general fertiliser, herbicide and fungicide program for tables, before and during the season. With all that and a few surprises this will be another seminar not to be missed.

On a committee level we are responding to the Minister for Environment and Conservation regarding water-recycling strategies and we have been asked to remind all turf managers about the facts on the phasing out of Methyl Bromide.

Please come to the joint TGAA stand at the national turf conference Number 44 to say hello and find out more about our initiatives. All groups under the TGAA banner will be represented at the conference. We wish the AGCSA all the best for a great conference and encourage all TGAA Members to consider supporting this National event where possible.

Robert Savedra
President, TGAA (Vic)

TGAA (ACT & surrounding region)

So much has been happening throughout the district that it's hard to know where to start, most importantly though is the A.C.T Turfgrass Association's Mid Year seminar.

This year's seminar will cover different aspects of turf nutrition such as the needs of different soil types, plant nutritional requirements, soil & tissue testing, fertiliser make-up & chemistry, application techniques & release methods of nutritional elements in different fertilisers. These are just a few topics, which will be discussed during the seminar.

Speakers at the seminar will include Professor Peter Martin who will discuss the comparisons between soil & leaf testing, which is more desirable & in what situation.

Dr Louise Barton from the University of Western Australia will be talking about the current study being undertaken by the university looking at nutrient leaching in predominantly sandy soils. Simon Leake from Sydney Environmental & Soil Testing Labs will inform us of the best way to take soil samples depending on location and soil type. What happens to the samples in the lab & how best to interpret the results. Robert Cooper from Scotts will be discussing slow release fertilisers & how they work. With such a wealth of knowledge present on the day, it will be another seminar not to be missed. We are also offering the chance for members to travel to other TGAA seminars in Melbourne or Corowa free of charge. All members have to do is ring Paul Janssens on (02) 62775616 during business hours and enter there name in the barrel. Four winning names will be drawn during the Canberra Seminar.

The seminar will be held on Wednesday the 24th of July at the Hellenic Club in Woden, Canberra. Entry will be $80.00 per head & includes unlimited tea / coffee & a full buffet lunch. The seminar will start at 8:00AM and conclude at 4:00PM. To ensure your spot or for any information relating the seminar please call Bruce Davies on (02) 62074623 or Fax: (02) 62074605 or E-Mail Keith McIntyre on hortengineer@netinfo.com.au Don't leave it too late or you might miss out.

If there is anybody who is interested in attending other Turfgrass Association Seminars in either Melbourne, Sydney or Corowa please contact Paul Janssens on (02) 62775616 ASAP.

Till next time, agrostologists.

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

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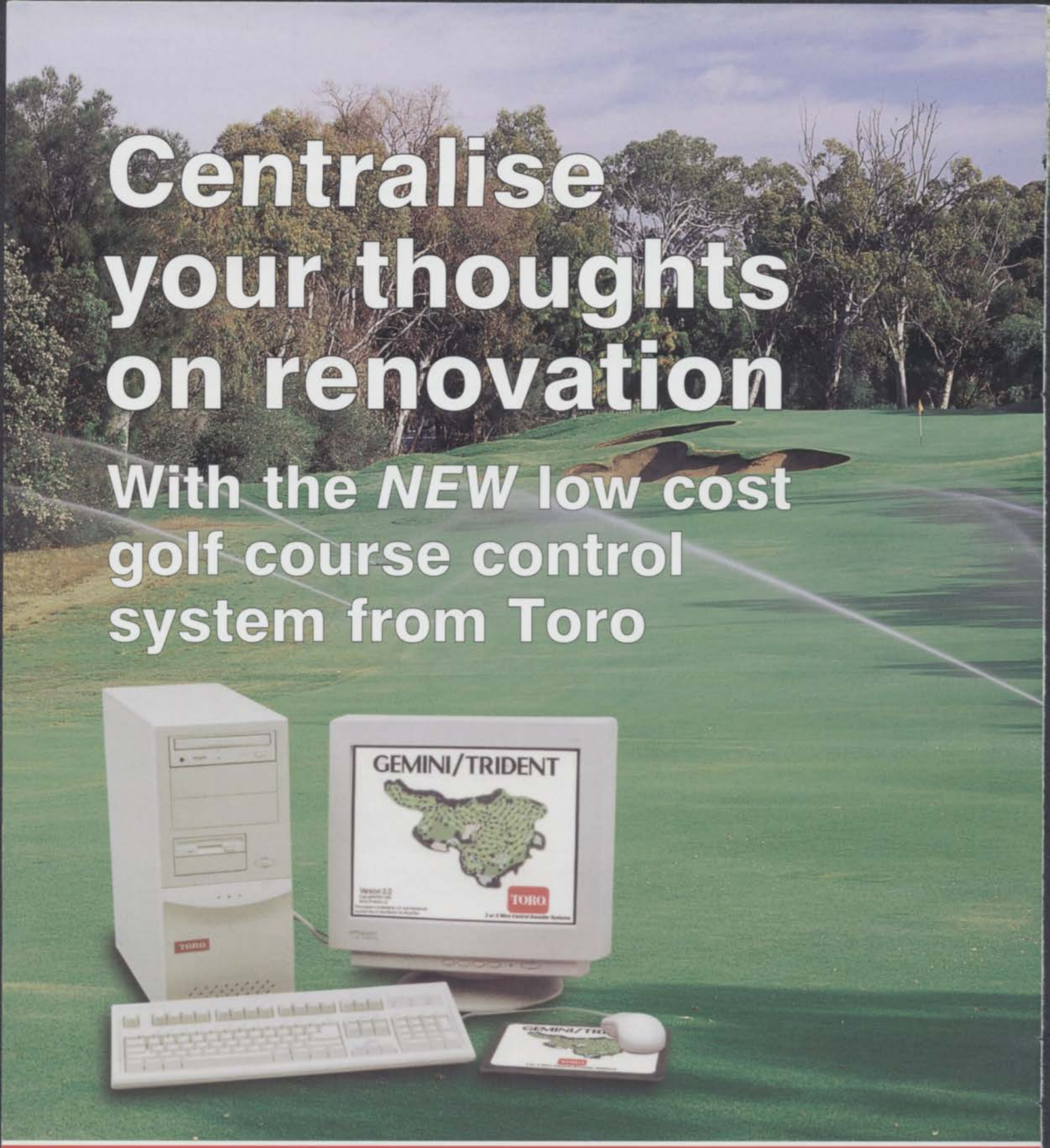

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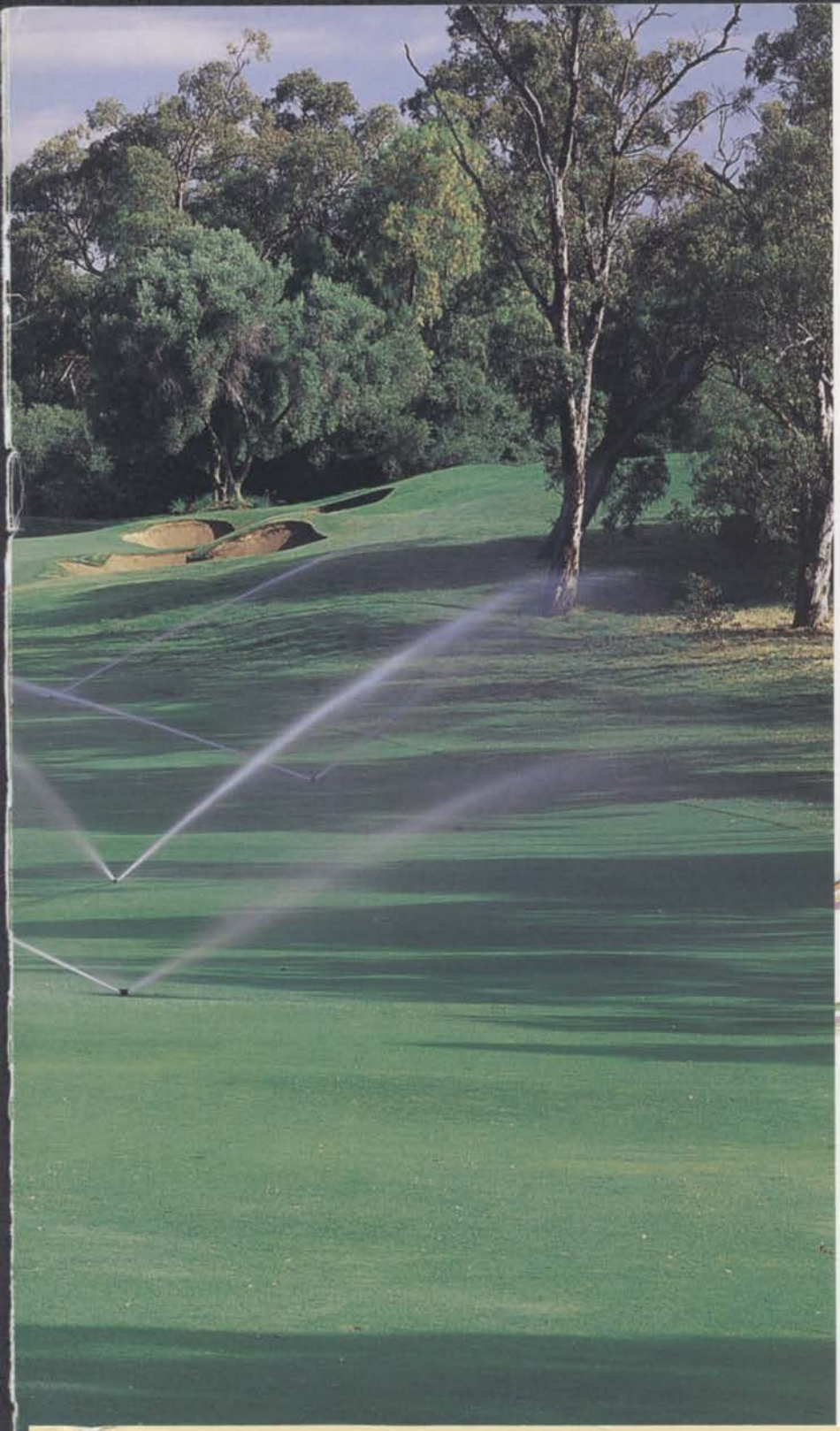

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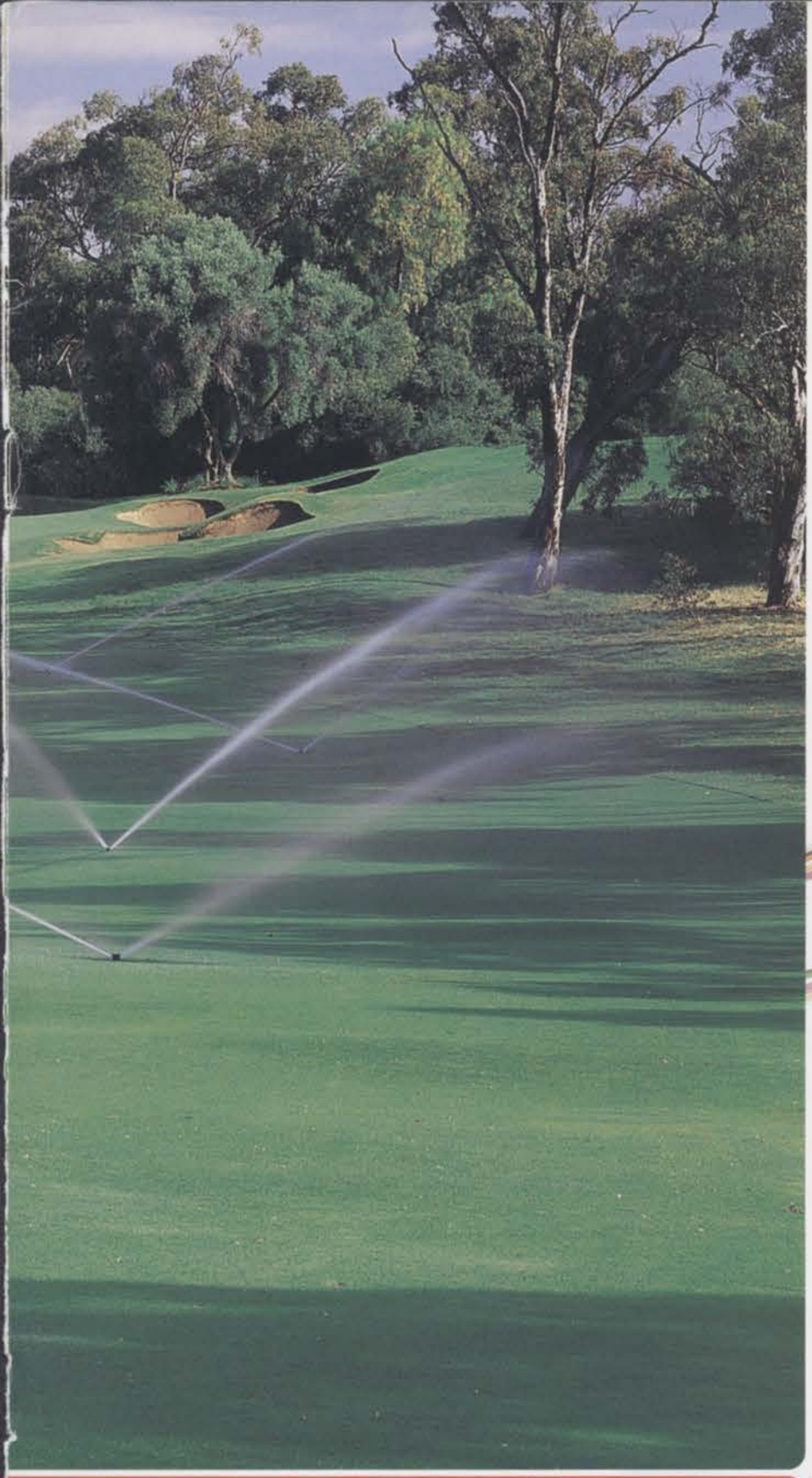

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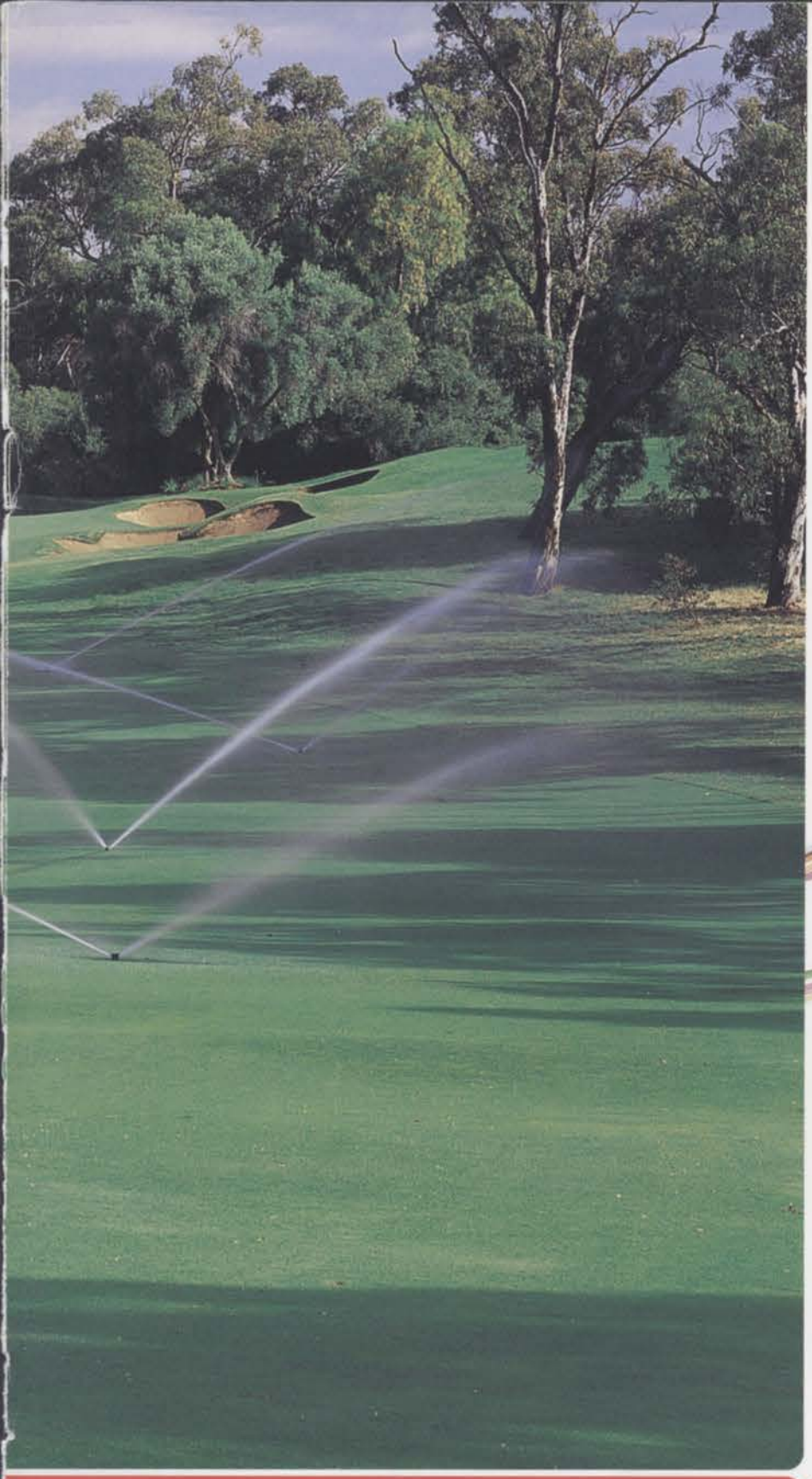

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- Built-in system diagnosis
- Radio Remote allows handheld manual watering
- Detailed reporting and operational log book
- On-line help screens

Simple. Affordable. Compatible.

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BEST®

FEED IT WITH

UMAXX™ STABILIZED NITROGEN FERTILIZER / UFLEXX™ STABILIZED NITROGEN FERTILIZER

18th Turfgrass

Come and talk to us on stand #77

The Nitrogen source that gives and gives

- *The UMAXX Range gives up to twelve weeks controlled release.*
- *The UMAXX/UFLEXX Range blocks Volitization*
- *The UMAXX/UFLEXX Range blocks leaching*

PRODUCT	ANALYSIS N	P	K	+	Prill Size	Technology	%CSR	Bag Weight	Rate Per 100m2	COMMENTS
BEST Couchmaster With Umaxx	23	1.2	10	Fe	Standard	UMAXX	99%	22.7kg	1.5-2.5kg	A quality control release fertilizer high in Magnesium, iron & Manganese producing exceptional colour.
BEST SportMAXX	19	1.3	15.9	Fe,S	Standard	UMAXX	69%	22.7kg	2.0-2.7kg	A high Potassium 3 particle blend for fairways, tees and sports fields.
BEST UMAXX	46	0	0		Standard	UMAXX	99%	22.7kg	0.5-1.0kg	Stabilized Urea Nitrogen. Highly soluble. Can be applied as granular or liquid form.
BEST TURFGOLD	22	2.1	4.1	Fe,S	Standard	TRIKOTE	47%	22.7kg	1.5-2.5kg	A premium slow release fertilizer that does not require immediate irrigation after application.
BEST WOOLAWARE K	13	0	24	Fe	Standard	TRIKOTE	57%	22.7kg	2.5-3.5kg	A high Potassium fertilizer with 5% Iron for use on Fairways, Tees and Sportsfields
BEST UFLEXX STD	46	0	0	S,Ca, Mag	Standard	UFLEXX	100%	22.7kg	0.5-1.0kg	Stabilized Urea Nitrogen highly soluable. Can be applied as Granular or Liquid form
BEST GREENSKOTE18	18	1.3	14.9	+TE	Micro	POLYON	75%	22.7kg	1.5-2.5kg	A premium micro-sized slow release greens fertilizer with 25% slow release potassium
BEST N K GREENS	20	0	20	Fe,S	Mini	UMAXX	80%	22.7kg	1.5-2.5kg	A soluble mini sized slow release greens fertilizer with a 1:1 N to K ratio
BEST HI K GREENS	15	0	28.6	S	Mini	UMAXX	98%	22.7kg	2.5-3.5kg	A high potassium mini sized slow release greens fertilizer
BEST HIGH N GREENS	30	1.3	6	+TE	Mini	UMAXX	80%	22.7kg	1.0-1.5kg	A high nitrogen mini sized slow release greens fertilizer for general maintenance.
BEST MAXX START	16	10	10	S	Mini	UMAXX	55%	22.7kg	2.5-3.5kg	A mini sized slow release starter fertilizer for use on greens & closely mown areas
BEST SUPER K	0	0	41	S	Micro	POLYON	98%	22.7kg	0.5-1.5kg	Polymer coated potassium for use on greens
BEST UMAXX MINI	46	0	0		Mini	UMAXX	98%	22.7kg	0.5-1.0kg	Stabilized Urea Nitrogen highly soluable. Can be applied as Granular or Liquid form

Simplot

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A.T.T. Turf Solutions