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MANAGEMENT

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DECEMBER - JANUARY 2001

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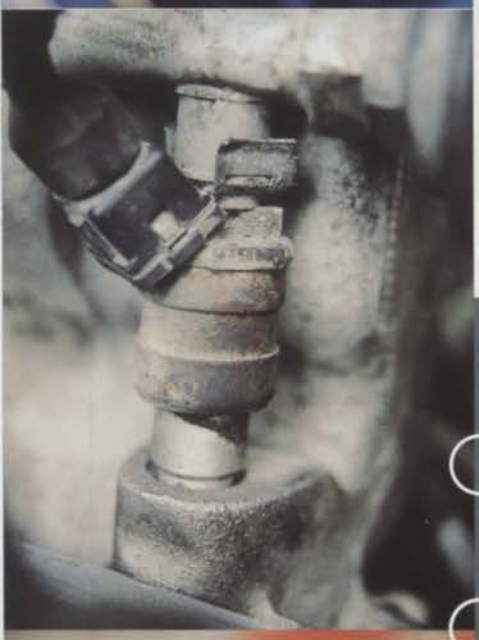

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Cutting Reel. Photo courtesy of John Deere

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Help us give you what you want and go into the draw to win $200 worth of AGCSA Merchandise

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Grease Monkey

At the heart of every pristine sports ground and picture perfect golf course, tucked far from where the eye can see is a maintenance facility dedicated to keeping modern scythes sharpened and turf chariots rolling.

This special edition is dedicated almost exclusively to issues related to turf machinery and I hope you enjoy reading it as much as I enjoyed pulling it together.

Heading an impressive list of Special Features is 'Tool Test'. We have taken a group of Turf Technicians and Machine Operators and turned them loose on the best the big boys have to offer. The result is a pretty comprehensive review on greens mowers and I hope you enjoy it.

Other features include a step-by-step guide to the proper setup and maintenance of cutting units and an article by Greg Buckingham from the Chisholm Institute that walks you through a 'Plant Risk Assessment". It could be the most important thing you ever do?

To find out all you will ever need to know about turf tyres, see the article on page 24 and by simply taking the time to tell us what you want (Page 52), you go into the draw to win $200 worth of AGCSA Merchandise.

In 'Research' Philip Ford examines couchgrass establishment methods and this month in REVIEW, an inciteful article by Scott Nesbitt explains why tomorrows Technicians will come to work in a lab coat rather than overalls.

Also in this edition, special guest contributor, Peter McMaugh takes over the reins in TECH TALK and John Neylan provides an update on the AGCSA trial site at Kingston Heath.

Finally, I wish everyone a Merry Christmas – see you in February next year.

Best regards

Phil George

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EDITOR

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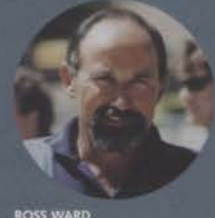

ROSS WARD
NOOSA HEADS BOWLS CLUB

New generation engines demand new skills

By Scott Nesbitt

Question: What do you get if you blend the smog in Los Angeles with rhetoric in Kyoto and The Hague; the economic rise of China with the collapse of the Soviet Union and a ship grounded on the Great Barrier Reef?

Answer: A future that will demand a quantum jump in the technical skills of the people who maintain, repair and operate the machinery that keeps golf courses beautiful.

Those seemingly disparate events around the globe are pushing the makers of diesel and gasoline engines into technical realms that will force technicians to become "diagnosticians" instead of "surgeons".

For some technicians this may require some serious adjustment because, to a large extent, the engines powering tomorrow's golf equipment won't have any adjustments at all. A "tune up" will no longer involve a mechanic with good ears, a wrench and a screwdriver tweaking the engine while its running. Instead, that technician will need good reading skills, a set of good analytical tools, and some weighty books that explain how to diagnose "interface and component malfunctions."

Regarding a new generation of engines from his company, Dave Warden, training supervisor for the Kohler Co., says "About the only thing you can adjust is the idle speed."

"A computer," he explains, "runs the fuel injection and the ignition system. Primarily, the technician needs a good multimeter and the ability to step through the troubleshooting book to determine where a problem lies and what needs to be replaced."

And this is an engine on a lawnmower. Albeit a premium riding lawnmower, but a precursor of the technology to come in the United States and eventually the rest of the world. Here's how events are conspiring to force a new level of competence onto golf course technicians:

Way back in the 1960s, people started protesting (among other things) the wretched smog in Southern California. That state mandated lower pollution from cars. The U.S. Federal government created the Environmental Protection Agency during the Nixon administration, and government began regulating vehicle emissions.

Initially, catalytic converters were installed, but in 1977 came primitive computerized engine controls; primarily feedback carburetors where the air-fuel mixture was regulated in response to the amount of unburned fuel in the exhaust. Within 10 years carburetors disappeared to be replaced by fuel injection. Government tightened the emission standards further and auto makers somehow kept meeting the standards.

European governments evolved the European Union, which beside minting a new coin, also came up with inter-nation agreements on emission controls for gasoline engines.

As the automakers leaped gasoline-engine hurdles, the governments created new rules targeting on-highway diesel trucks. In the U.S., California continued to lead the charge. Late in November this year the state won a court case and a number of manufacturers have agreed to begin making cleaner engines in 2002. Within days 13 other states adopted the same diesel truck emission rules and now 40% of the U.S. heavy truck market has very high emission standards.

That news came as governments were meeting in The Hague to update the 1997 Kyoto protocol on global warming; some 100 developing nations have ratified that United Nations agreement to reduce greenhouse emissions, while the major industrialized nations have not - yet! However, the handwriting is on the wall, due in part to the collapse of the Soviet Union.

Without the "Evil Empire" to struggle against for political advantage, the nominally-allied Western industrial nations have begun seeking new economic advantages in the less-developed nations. This has caused intense competition amongst manufacturers and their home governments. The Soviet collapse opened up new markets in Russia and its former satellites; it also helped convince China's leaders to relax economic controls in that nation. The net result is potentially major new economic development zones in Asia and

1. Fuel injector.
2. Oxygen Sensor.
3. Toolbox for the modern turf technician.
4. Banked control relays.
5. Modern liquid cooled machine.

Europe. Much of that development must inherently be powered by trucks and construction equipment.

The big engine makers from Europe, Asia and the United States have plunged into the development game. The potential new customers are still 'cash poor', thus, equipment prices must be held down if companies hope to gain a toehold in the new markets. The end result is reduced corporate profits. One proven way to save money is to merge with a competitor to save infrastructure and extract operational synergies. Recently, there has been a wave of mergers and buyouts as smaller companies in the machinery and engine businesses are swallowed by a few giants left to contend for global markets.

One way to hold down per-unit costs is to standardize designs. This means that high-tech, low-pollution gasoline and diesel engines designed for the U.S. and European markets are becoming the world standard. At some point, it will no longer make sense to build separate low-tech engines for countries that do not have demanding emission controls.

For people in the golf and turf industries in Australia, New Zealand and other advanced but low-population nations, this means that the machinery they see will essentially be the same as that sold into the giant U.S. turf market. That also means engines that meet the EPA emission rules and that will present new challenges to turf technicians.

Kohler Co.'s Warden and his staff have over the last year been introducing service technicians to the new Command EFI (electronic fuel injection) engines. These first appeared last year on a horizontal-shaft twin-cylinder 26-horsepower model, part of the Command series that features overhead valves, full-flow oil filtration and numerous other commercial-duty features. This year the company rolls out a 26-horsepower vertical-shaft EFI model.

Adding to the technical innovation in its twin-cylinder engines, Kohler is now producing a new Aegis engine line with liquid cooling systems in place of the traditional air cooling found on small engines. The Aegis series will have horizontal- and vertical-shaft models from 17 to 26 horsepower. There will also be the new Triad line, with 20 and 23-horsepower models with overhead camshafts

and rubber timing belts, just like most modern 4-cylinder autos.

On the diesel side of the ledger, manufacturers have taken three major paths:

1. Internal changes to cylinder head configurations, adding more intake and exhaust valves and changing details of engine layout to improve combustion efficiency.
2. First seen on large on-highway diesels, is electronic engine controls that interpose a computer between the operator and the fuel injection system.
3. The development of exhaust systems that both trap smoke particles and also convert chemicals in the exhaust (notably nitrous oxides) into harmless component elements.

These technological changes demand technicians who know how to use instruments designed to differentiate between a plugged diesel exhaust system and a plugged fuel injector. The era of the 'shade-tree mechanic' is ending.

For some insight into the future, note the control systems on the new Kohler engine line;

At the heart of the engine control system is the ECU (Electronic Control Unit), a computer that regulates the amount of fuel going to the cylinders and the timing of the ignition spark. The ECU uses a pre-programmed 'map' that tells it what to do in each situation the engine might encounter. When load on the engine increases, the ECU ads more fuel and advances the spark to produce more power. Each different kind of machine needs a different ECU program to properly control engine operation under the loads imposed by the particular vehicle. Thus, the ECU from a bunker rake will not properly operate the engine on a riding greens mower.

To "understand" its operating environment, the ECU program requires input data from several different sensors. These include:

- Engine speed sensor, which reads flywheel rotational speed
- Oil temperature sensor. Lets the ECU know when the engine has reached operating temperature
- Throttle position sensor, so the ECU knows what engine speed the operator wants
- Oxygen sensor, which detects oxygen in the exhaust. Without this sensor, the ECU can't tell whether it is has the right fuel and ignition settings for maximum efficiency.

Based on the information from the sensors, the ECU works its magic by controlling the fuel injectors and the ignition module.

There are two fuel injectors, one for each cylinder. The output nozzle of the injector is mounted in the intake manifold just behind the intake valve. Inside the injector is a small but strong electric solenoid that lifts a plunger sealing off the output hole in the nozzle tip. The plunger lifts the same distance each time it is activated. The ECU controls the amount of fuel by regulating how long the solenoid receives an electric pulse that lifts the plunger. To limit the amount of fuel that must be injected with each cycle, the plunger is activated each time the crankshaft turns. Therefore, a four-cycle engine injects fuel during the intake cycle, when the valve is open, and on the opposite compression cycle when the valve is closed.

Feeding the fuel injectors is a high-pressure fuel pump and a separate regulator that feeds at about 39psi to the injectors. That's up to 10 times the fuel pressure used for carbureted systems. An ultra-fine fuel filter keeps particles below 15 microns from entering the fuel system.

Igniting the fuel in the cylinders is a sealed ignition module that delivers a spark at the command of the ECU. The ECU has two programs. When at normal operating temperature, the ECU uses a 'closed loop' program that uses feedback from the oxygen sensor to maintain the most efficient fuel/air ratio.

However, the oxygen sensor does not start sending a signal until exhaust gas has heated it to about 375°C. During warm-up from a cold start the engine uses an open loop operating program that responds only to the throttle position sensor and speed sensor. The oil temperature sensor must reach 30°C to make the switchover from open to closed loop operation.

A third is a 'limp home' operating program that allows the engine to run at reduced efficiency if something goes wrong with the system. When there is a problem, there is a "Malfunction Indicator Light" (MIL) that flashes a set of codes that informs the technician that a problem has been detected. The ECU is programmed to either shut down the engine, or allow the operator to limp home for closer inspection.

All the sensors are sealed, factory-calibrated units that can only be replaced, not repaired. About the only repairs possible are on the order of replacing spark plugs, ignition cables and fuel lines. But even the fuel lines aren't normal, they are a special high-pressure reinforced hose that must be fastened with special hose clamps that won't cut the hose like over-tightened conventional clamps.

Warden said that is his experience preparing service instruction, special attention must be paid to the wiring harness and the various electrical connectors that tie the ECU and the other components together.

"The wiring has always been the weak point in electronic vehicle systems," Warden said. "That's why one of the best things you can do is get a good multimeter."

As EFI and its new service requirements filter into the golf community over the next few years, it's likely that a number of engines will also use the new liquid cooling systems. This is because cylinder temperature is a major variable in combustion efficiency in an engine. The ability to stabilize that variable makes it much easier to produce a pre- programmed map for an ECU to follow.

Hopefully this new technology will not only reduce the impact turf maintenance has on the environment but it will make our machines more reliable which enables them to stay out on the course where they belong.

Scott Nesbitt is a regular contributor for Golf Course Management magazine

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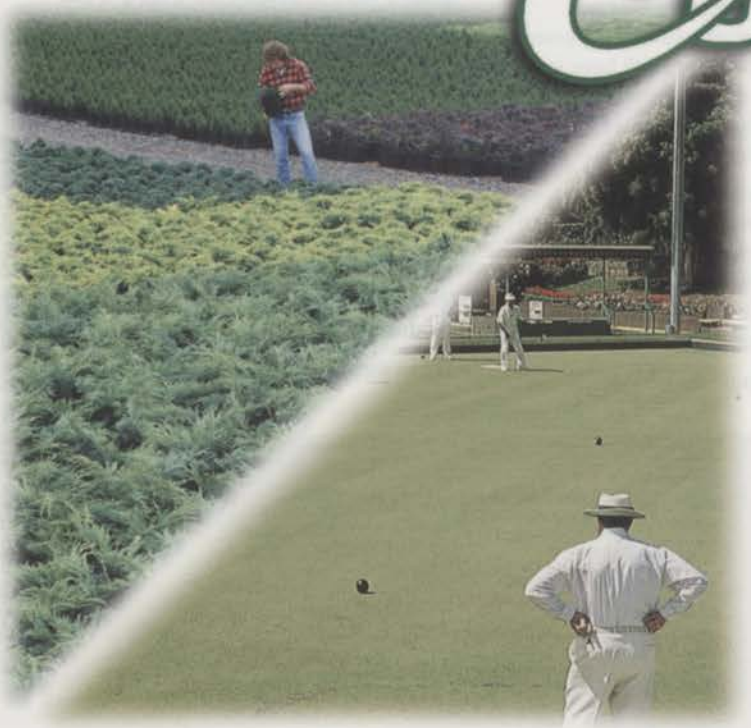

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Cutting height and turf physiology

By Peter McMaugh

A PhD student, his Professor and two visitors from Australia are visiting a University in the USA. We are asked by the Professor to comment on the student's program of selection for superior turf strains in a breeding program. It was explained that the plants were grown in small tubes, clipped at 75mm and the most dense plants selected for the next round of breeding.

I was quite amazed by this process (and said so) because what the program was selecting for was not a primary genetic response but an induced physiological reaction to clipping. Both the Professor and his student had not really thought through the physiology and were wrongly attributing the response directly to genetic superiority.

Every plant has an inherited hormonal program that controls its growth. The terminal bud (apex) of the shoot controls how the plant shoots laterally. In some plants control is so dominant that only one long shoot is developed. In others the dominance is poor and a lot of shrubby lateral growth is produced.

Grasses are exactly the same as other plants and behave in exactly the same way. Take the apex out of the tall growing tree and it will branch laterally. Mow the tillers (stems) of an upright grass and it will bunch i.e. it will put up more tillers.

Initially, this would suggest that you can manipulate grasses which have inherently high apical dominance with spindly growth to become superior turf plants.

We all know that while there is some truth in this, it doesn't quite work that way. Why not? Well, almost invariably, grasses with high apical dominance will have a crown that is high off the ground in clump grasses and creeping types will generally have long open inter-nodes.

The initial response to mowing will be increased tillering that will result in greater density in clump types. However, when mowing is so low that the growth apex is removed the plant is damaged and starts to weaken and thin out.

The history of turfgrass development is one of association with heavy grazing pressures from the most severe grazing animals, sheep.

Among the cool season grasses, those with low crowns and with rhizomes have become successful turf grasses. The four outstanding genera have been Agrostis, Festuca, Lolium and Poa.

The successful development of turf type Rye (Lolium spp) is due to selection for dwarf types that have low crowns and a late flowering habit. This latter characteristic is very important, as at flowering, upright grasses want to become more upright and throw more tillers for seed rather than leaf. It is for this reason that the perenniating types of Poa annua survive from year to year while the truly annual types do not.

The response of warm season grasses that have a spreading habit is different when the 'runners' are cut. The separated nodes now begin to act like individual plants and their first reaction is to produce more tillers in an upright direction and to then produce more stolons.

When these grasses are sliced their density

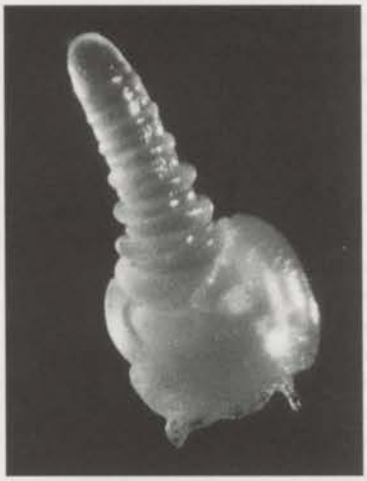
does increase but they also become more susceptible to damage from close mowing. This is because the slicing has induced the plants to put their growing points into a more vertical position where they are more easily damaged by traffic and close mowing.

It was only when botanists were able to examine the growing points of grasses in great detail with a Scanning Electron Microscope (SEM) that they were able to see that it is very early in the development of the growing apex that future leaves and stems are formed.

The photograph showing the plant apex in formation clearly illustrates why cutting into the apex does so much damage to turf grasses and why they take so long to recover.

As cutting height is lowered and the crown is destroyed, the plants ability to restore itself is destroyed. It requires enormous resources to re-build the meristematic crown so if repeatedly damaged, by mowing, it all becomes too

Photographs showing the plant apex in formation ↓



Emerging tillers, Kentucky Bluegrass (Poa Pratensis) ↓

much for the plant and it simply dies.

Thus when selecting turf types a breeder is always looking for a low crown and high tillering. In the case of creeping grasses we look for short inter-nodes and high lateral bud development.

These aspects of plant development should not surprise any seasoned turf practitioner. Most of us have seen how many grasses react very differently to the same mowing practices. Consequently, you can't treat the new 'moss type' bent grasses the way you used to treat Pencross.

Every new round of bent grasses brings more miniscule plants with greater density and thatching (the moss types). The reality of these newer grasses is that they have such a dwarf habit that the growing points are proportionately closer to the surface canopy than is the case in coarser varieties. This is why the moss types are very sensitive to sudden lowering of cutting heights and why they must be mown very early in their life to avoid plant damage when cutting heights are lowered.

The same problems will be experienced by those who aggressively de-thatch and mow bent grasses in the hot conditions of summer when bent grasses instinctively go into survival mode. This summer dormancy shuts down the plant's regenerative capacity and severe damage at this time will not be repaired and greens will be easily lost.

Cutting heights and the timing of mowing are critical in management programs. Lowering cutting heights at the end of summer weakens summer dominant grasses as does lowering them too early in spring. At times when the plant needs to store or is using stored food for growth, aggressive cutting can result in severe damage. It is not just the meristems, which are affected, but it critical that the food producing leaf canopy is maintained at these times.

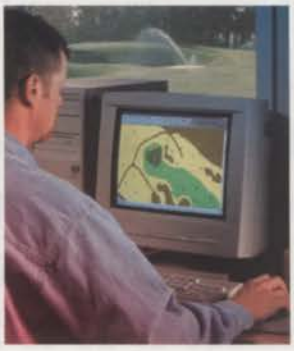
The different management techniques required for the maintenance of warn season grasses is never more evident than with, Santa Ana couchgrass. Aggressive cutting of this variety can cause enormous damage when it is done where recovery is slow. This is a feature of all grasses with an upright growth habit and this applies just as much to Kikuyu varieties as it does to couch.

The mowing rule-of-thum to never remove more than one third of the height in a mowing, needs the added dimension of the need to begin mowing earlier when growing dwarf grasses.

Peter McMaugh is a well known turfgrass consultant and grower.

Photographs coutesty of Dr J Wilson, CSIRO Queensland and Dr D E Aldous, University of Melbourne, Victoria.

What's Driving Your Course?



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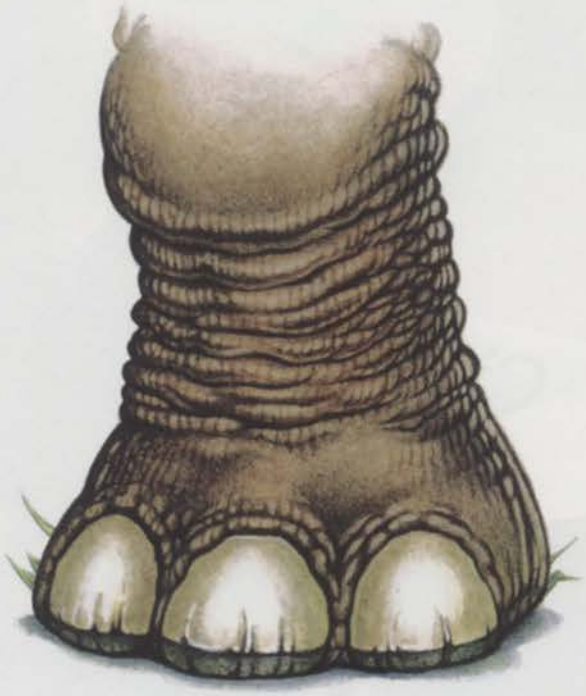

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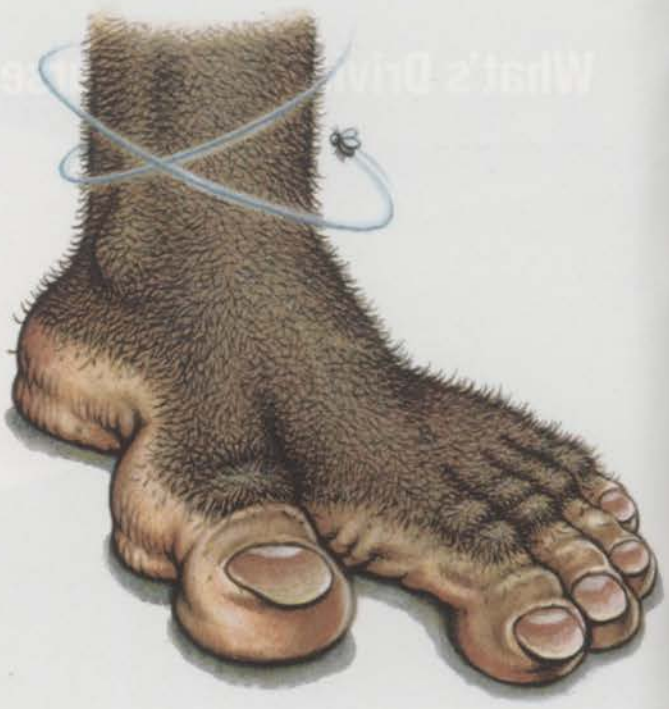

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TOOL TEST:
RIDING GREENS MOWERS
BY PHIL GEORGE

Green Mowers are the "Jewel in the Crown" and the "Pride of the Fleet" in any golf course maintenance facility.

Machinery Evaluations are to become a regular part of ATM in 2001. What better way to start than by taking a comprehensive look at these three riding greens mowers:

- Toro Greensmaster 3250 D
- Jacobsen Greensking GK IV Plus
- John Deere 2500 Tri-Plex

We had hoped to look at the new Greensking VI from Jacobsen but it seems that strong sales meant that a new machine was not going to be in the country until the end of December. Textron Turfcare were happy to provide an earlier model.

EVALUATION PROCEDURE

Each machine was evaluated and assessed on their performance in different categories;

1. Serviceability
2. Operator use and performance
3. Comparison of specifications and maintenance requirement

A group of four Turf Technicians were selected from within the golf turf industry and as a group they were asked to carry out and comment on a range of different service requirements on each of the three machines. These areas included: Access to drains and filters, greasing, cutting head removal, backlapping and cutting height adjustment. Each technician was required to give the machines a score out of ten, then provide some comment to justify that score.

The Turf Technicians were:

- David Stewart – Riversdale Golf Club
- John Haines – Kew Golf Club
- Martin Fergus – Metropolitan Golf Club
- Graham Sharrock – The National Golf Club

Four Machine Operators with varying levels of experience were asked to assess each machine from the perspective of ergonomics and how 'user friendly' the machine was when cutting greens and transporting from one green to another. As with the Turf Technicians, the Operators were asked to score machines for comfort, access to controls, visibility, cutting greens and transport.

The Machine Operators were:

- John Geary (VGCSA President) – Frankston Private Golf Club
- Tim Smart – Riversdale Golf Club
- Robert Savedra (TGAA President) – Wesley College
- John Slykhouse – Holmesglen Institute of TAFE

Ex Massey Fergusson Mechanical Engineer, Donald Quick made detailed analysis of the machines service and operator manuals and measured cutting unit tip speeds and engine noise. He also made some comparative estimates of service requirements.

Finally, AGCSATech's John Neylan and Michael Picken, Golf Course Superintendent from Riversdale Golf Club made an assessment of "quality of cut"

TABLE 1: SERVICEABILITY

	Access to Drains and Filters	Greasing	Cutting Head removal	Backlapping	Cutting Height Adjustment
Toro Greensmaster 8 3250 D	7.5	7	7.75	7.5	
Jacobsen Greensking 8.5 GK IV Plus	6.5	6	8.25	8.75	
John Deere 2500 Tri-Plex	6.25	7.75	8.25	7.75	7.5

SERVICEABILITY [See Table 1]

Toro Greensmaster 3250 D

The Greensmaster scored 8's from all Technicians on 'access to drains and filters'. Obviously they were all generally happy with the access but commented that the hydraulic oil filter was hard to get at and that fluid would leak onto the rear roller when being changed. One recommended a 'strap tool'. Apart from the middle left arm pivot, there were no real problems with greasing and all commented that the 'grease point chart' was an excellent idea. The Greensmaster rated second of the three in 'cutting head removal'. Generally, head removal is simple and quick, but all technicians commented that the centre cylinder head is "fiddly and hard to access". The general consensus on backlapping was summed up by the following, "Backlapping is a simple process with switch position easy to locate and there was a good variation of speed control." The Greensmaster scored equal second in backlapping, marginally behind the GK IV. Although the Greensmaster scored well for 'cutting height adjustment', the Technicians did mark it down because of poor access to the rear roller.

Jacobsen Greensking GK IV Plus

The GK IV Plus was marked on top for 'access to drains and filters', 'backlapping' and 'cutting height adjustment'. The good access is something you notice just by looking at it, infact it looks more like some kind of landing vehicle for planet Mars than a greens mower. Obviously looks aren't everything when it comes to serviceability!

Most Technicians did make the point in their comments that both the hydraulic and fuel filters are "directly over the cutting unit and there could be spills onto it". Having the capacity to backlap one reel at a time was an advantage although one technician did make the observation that 'twin point adjusters' are more time consuming and that they can lead to problems if the operators play with them. Excellent marks were given for 'cutting height adjustment'. All Technicians remarked on the good access to and the ease with which they were able to adjust the front roller. Also, the ability to 'tip-up' the front cylinders was a handy feature. The one negative comment was that "the plastic adjusting knobs could have a tendency to break". The GK IV Plus did not get good marks for greasing with nipples on the traction shaft and under the pedal not easy to get at. The machine also scored poorly on 'cutting head removal' with the absence of a quick release mechanism on the hydraulic motors an obvious downfall. Also, The GK IV was the loudest machine in the shed (refer to Table 6).

John Deere 2500 Tri-Plex

The John Deere 2500 Tri-Plex received poor marks for 'access to drains and filters'. All four mechanics found the hydraulic and oil filters to be troublesome and prone to spillage. However, the machine quickly bounced back with scores of 8's for 'greasing'. The remote greasing point on the centre pivot of the arm was considered an excellent idea. The 2500 also scored top marks for 'cutting head removal', mainly due it seemed to the quick release hydraulic motor and the simple pin system attaching the heads to the frame. An average rating of 7.75 for backlapping was also a good score. Comments would indicate that the backlapping switches and the speed control were easily accessible and operated. Like the Toro machine, the 2500 was behind the GK IV in 'cutting height adjustment'. This seemed due to difficulties experienced in adjusting the rear roller.

OPERATOR USE AND PERFORMANCE [See Table 2]

Toro Greensmaster 3250 D

Although it was just behind the others, the Greensmaster scored well for 'comfort', "Seat and steering wheel adjustment was good for an operator who is 5'81/2" was one memorable quote and all Operators found the operating position very comfortable. One operator scored visibility at 9 out of ten, whereas another only gave it a four because the steering column blocked the view of the right hand cutting unit. The same was true for 'access to controls', one operator thought they were in "excellent position", others didn't like the steering wheel adjustment and thought that the "switch to engage the reels was to far from the steering wheel". For 'cutting greens' and 'transport' the Toro machine scored very well with one operator remarking that "The machine has superb manoeuvrability and takes 180 degree turns in its stride. Cutting reel engages instantaneously and access to the center catcher is excellent". As for transport, there was plenty of power on offer and the operators found the choice of ground speed to be excellent.

Table 2: *Operator Use and Performance*

	Comfort	Access to Controls	Visibility	Cutting Greens	Transport
Toro Greensmaster 3250 D	8	7.5	7	7.75	7.5
Jacobsen Greensking GK IV Plus	8.5	6.5	6	8.25	8.75
John Deere 2500 Tri-Plex	6.25	7.75	8.25	7.75	7.5

Jacobsen Greensking GK IV Plus

The GK IV Plus scored a 7.5 for both 'comfort' and 'access to controls'. On comfort, the Operators made the following comments; "the seat was ample and well padded – an improvement on older models". Comments were just as positive for access to controls with Operators, like the Technicians, appreciating the key operated backlapping arrangement and the prominent temperature gauge but most were also critical of the location of the throttle control. Not surprisingly the Greensking received excellent scores for 'visibility' and for 'cutting greens'. Operators found that manoeuvrability was excellent and the foot control for engaging the cutting units was well positioned and reacted instantaneously. One operator felt that changing from forward to reverse was difficult. The machine was again let down by the throttle control when it came to 'transport' but picked up marks for its excellent vision.

John Deere 2500 Tri-Plex

The John Deere 2500 scored outstanding marks for both 'comfort' and 'access to controls'. All operators found the seat padding and adjustments to be very comfortable and the TOPS bar made dismounting very easy. Although one operator found the controls confusing at first, most thought that the controls on the one console is a good idea. Marks for visibility were only average but as with the Toro, the scores were quite variable. One operator found that the offset cutting reel on the left-hand side helped cutting visibility but also found that the control console did limit side vision. Although the average rating was 8.75, the 2500 scored the only 10 of the day in 'cutting greens'. It seems that it was the smooth pedal control and the 'one-touch' control that found favour with the Operators. The John Deere also scored excellent marks for 'transport' with most finding that traction on sloping ground was good and there was plenty of power on offer.

QUALITY OF CUT

	QUALITY OF CUT
Toro Greensmaster 3250 D	8
Jacobsen Greensking GK IV Plus	6.75
John Deere	7.25

On the eighteenth green at Riversdale Golf Club each machine mowed in one strip and unaware of which machine did which strip, John Neylan and Michael Picken were asked to make a visual assessment of 'quality of cut'. This was an interesting exercise but the lack of repetition and subjective nature of the assessment does make the value of this assessment questionable.

COMPARISON OF SPECIFICATIONS AND MAINTENANCE REQUIREMENTS

Safety

Regulations (in Victoria at least) require that tractors be fitted with Roll Over Protection System (ROPS) and seat restraints, if it is assessed that a roll over is likely. In Don's opinion, the mowers should all be fitted with ROPS or TOPS (Tip Over Protection System) and seat belts. A TOPS was fitted to the John Deere machine but there was no seat belt. According to the accessory list, a ROPS is available for the Toro machine.

All mowers were above the lower mass limit (560kg – as per AS1636) – see 'Vital Statistics table.

Don felt that the Jacobsen machine needed some guarding around the fan belt.

Stability

The John Deere machine had its engine mounted above the rear wheel and had a track that was narrower than the Jacobsen by 270mm. This makes the machine less stable than the others. This may not be significant on greens but Don said that he would feel more comfortable if it was fitted with a seat belt.

Floatation

The John Deere is the heaviest of the three machines but the largest tyres (20x10-10) carry it. At 609kg, the weight of the Jacobsen is almost identical to that of the Toro machine but its ground pressure would be greater given the smaller running gear (18x9.5-8)

Cutting Efficiency

All mowers had a reel speed that was close to 2100 rpm. A ground speed of 7km/hr with an 11-blade reel delivers a clip rate of 4.4mm. Therefore, the theoretical cutting efficiency of the three machines was identical.

Noise Level

Noise level was measured at the operators ear, whilst the machine was stationary and at full revs but without the reels engaged. Operating the reels generally increases the noise level by approximately 1 Dba. At 85 Dba (maximum level at which hearing protection must be worn for exposure exceeding 8 hours), the Jacobsen was the loudest machine. The Toro, at 81 Dba was noticeably quieter and the John Deere split the difference at 83 Dba.

TABLE 3: *Total Estimated Lobour Cost - Calculated at $50/hour*

		Time Taken for Task (hrs)	Total Hours/year			Total cost/year @ $50/hour		
			JD	TORO	JAC	JD	TOBO	JAC
Air Filters	Clean*	0.3	10	50	100	750	150	75
	Replace	0.2	200	200	250	25	25	20
Engine Oil Filters	Replace	0.4	200	100	100	50	100	100
Engine Oil	Replace	0.4	200	50	75	50	200	133
Fuel Filter	Replace	0.3	600	800	500	12.5	9.4	15
Coolant	Replace	0.5	600	500	250	20.8	25	50
Hydraulic Oil Filter	Replace	0.4	600	800	250	16.7	12.6	40
Hydraulic Oil	Replace	0.5	600	800	250	20.8	15.6	50
Alternator Belt	Check&Adj	0.3	200	50	100	37.5	150	75
Brakes	Check&Adj	0.5	600	50(E)	250	20.8	250	50
Wheel Bolts	Check	0.3	100	200	200(E)	75	37.5	37.5
Muffler & Exhaust	Check	0.2	250(E)	250(E)	250	20	20	20
TOTALS						$1099	$995	$666

(E) = Estimate, where no figures are available,(*) = Recommendation only, daily may me excessive in normal conditions, Method: $ cost/annum = 500/hourly interval x operation hours x $50

TABLE 4: *Costs of parts for an estimated 1000 hours or 2 years*

	Part	# per 1000 hours	Cost of part	Total Cost	Total Cost of Parts
Toro Greensmaster 3250 D	Air Filter	5	$48.58	$242.9	
	Oil Filter	10	$24.42	$244.20	
	Fuel Filter*	1.25	$134.37	$168.00	
	Hydraulic Filter	1.25	$82.65	$103.31	
	Bed Knives (set of 3)	2	$149.25	$298.50	$1056.90
Jacobsen Greensking GK IV Plus	Air Filter	4	$35.27	$141.10	
	Oil Filter	10	$24.42	$244.20	
	Fuel Filter	2	$8.27	$16.54	
	Hydraulic Filter	4	$54.27	$217.10	
	Bed Knives (set of 3)	2	$232	$464.00	$1082.95
John Deere 2500	Air Filter	5	$41.50	$207.5	
	Oil Filter	5	$18.41	$92.05	
	Fuel Filter	1.66	XX	$16.60	
	Hydraulic Filter	1.66	$56.65	$94.05	
	Bed Knives (set of 3)	2	$312.75	$625.50	$1035.70

XX = No price was supplied (has been estimated at $10), # = The fuel filter on the Toro Greensmaster 3250 D is also a Water Separator Canister

It is worth noting that John Deere market a 'Service Pack' with the 2500 for $290.65. It contains all the items listed above and is designed to meet the recommended service requirements for one year.

To calculate total estimated service cost add the Total Labour Cost from Table 3 to the Total Cost of Service Parts in Table 4. Please note that Total Labour Cost (Table 3) is calculate for 500 hours and therefore that figure must be doubled before adding it to the Total Cost of Service Parts.

TABLE 5: *Machinery Cost – Cost of Machine as Standard and with Options*

Greens Mower	OPTIONS	$ COST
Toro Greensmaster 3250 D *Standard with lights and backlapping kit* STANDARD COST = $38,500	Leak Detection System	$1350
	Verti-Mowing Reels (set of 3)	$4450
	Turf Groomers (set of 3)	$5350
	Greens Spiker (set of 3)	$6400
	Powered Rear Roller Brush Kit	$2700
	Tri-Roller (set of 3)	$5300
Jacobsen Greensking GK IV Plus STANDARD COST = $39,517.50	Verti-Mowing Reels (set of 3)	$5808
	Turf Groomers (set of 3)	$6418.50
	Rear Roller Cleaning Brushes	$1666.50
	Rear Roller Scrapers	$99
	Quick Roll Attachment	$4224
John Deere 2500 STANDARD COST = $40,000	Verti-Mowing Reels (set of 3)	$4536
	Turf Groomers (set of 3)	$5538
	Rear Roller Power Brush	$2289
	Three Wheel Drive	$2898
	Front Headlight Kit	$295
	Armrest Kit	$167

Please note that all prices are GST inclusive and subject to change.

ACKNOWLEGDMENTS

Special thanks must be given to each and every one of the evaluators used in this Machinery Assessment. They all gave their time voluntarily and the integrity and dedication that they applied to their respective tasks and evaluations was exemplary and was in keeping with their standing in the industry.

Many thanks also to Michael Picken, his staff and the Riversdale Golf Club for their generosity and patience in allowing us use their facilities

We also had the opportunity to measure noise level on the Jacobsen Electric Greens Mower. It didn't even register.

Maintenance

In terms of the kind of attention required to maintain the cutting heads, carry out regular checks keep filters clean and to keep the machine well lubricated etc., maintenance requirements on each of the mowers was similar.

The differences in routine maintenance were in the recommended intervals given by the manufacturers for doing things such as changing oil and fuel filters. Routine maintenance items were recommended a little more frequently for the Jacobsen but overall, the differences were not major.

TABLE 6: Vital Statistics

VITALS	Toro Greenmaster 3250 D	Jacobsen Greensking GK IV Plus	John Deere 2500 Tri-Plex
Fuel	D	D	D
Horse power	21	19	18
Eng. Disp. (cc)	850	656	585
Cutting Width (mm)	1500	1340	1575
Weight (kg)	608	607.8	626
Wheel Base (m)	1230	1308	1295
Noise (Dbc)	81	85	83
PRICE	$38,500	$39,517.50	$40,000

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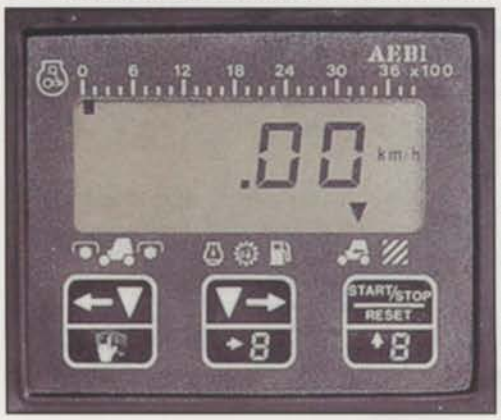

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Compared with a traditional tractor or implement carrier, you can treat your turf with the care it deserves, above all because of the Terratrac's low wieght. The extremely low centre of gravity and the wide wheel base give an unequalled ability on slopes.

The implementation of standardized hydraulic linkages ensures the simple and fast connecting.

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'Organics' in Turf

Muck without the mystery

Over the past ten years Organic Crop Protectants have been slowly building a range of products that provide turf managers a balanced approach to turf management. Turf management in Australia, as with the rest of the world is changing. There is greater fusion of "organic" practices with conventional turf management. However, recently we have noticed a flood of organic products into the turf market, some with a proven history, while others could be put into the classification of "muck and mystery". Some of these products are being sold to turf managers with an almost evangelistic zeal, making it difficult to take a step back and critically analyse their true benefits, if any.

Organic products suffer from the fact that just about anyone with a 1/2 acre block, a 44 gallon drum and a piece of 4x2 timber can stir up an organic bio-stimulant which has the regulation "twenty secret herbs, spices and microbes". But his is also the case with a number of products being cast from foreign shores, by 'reputable' companies.

OCP are committed to the market development of quality proven products. We only introduce products that have either a long history of performance in agriculture or have been properly researched by Universities or other government departments.

Most turf managers are probably aware of the OCP range including **Hydretain Turf®**, **Synertrol Oil®**, Acadian SSE®, **Aminogro®** and **FumaFert®**. But few would know that we have recently launched an Australian researched and developed Trichoderma product called **Trich-A-Soil®**.

Trich-A-Soil® is a beneficial soil inoculant, researched by Dr Percy Wong from the NSW Department of Agriculture. **Trich-A-Soil®** contains are very active strain of Trichoderma. It is manufactured in Australia using very strict quality control. The manufacturing process for **Trich-A-Soil®** allows us to produce 1000 million spores/gram of product. This is ten times higher than other leading Trichoderma products, and is very cost competitive.

PRODUCT COMPARISON TABLE

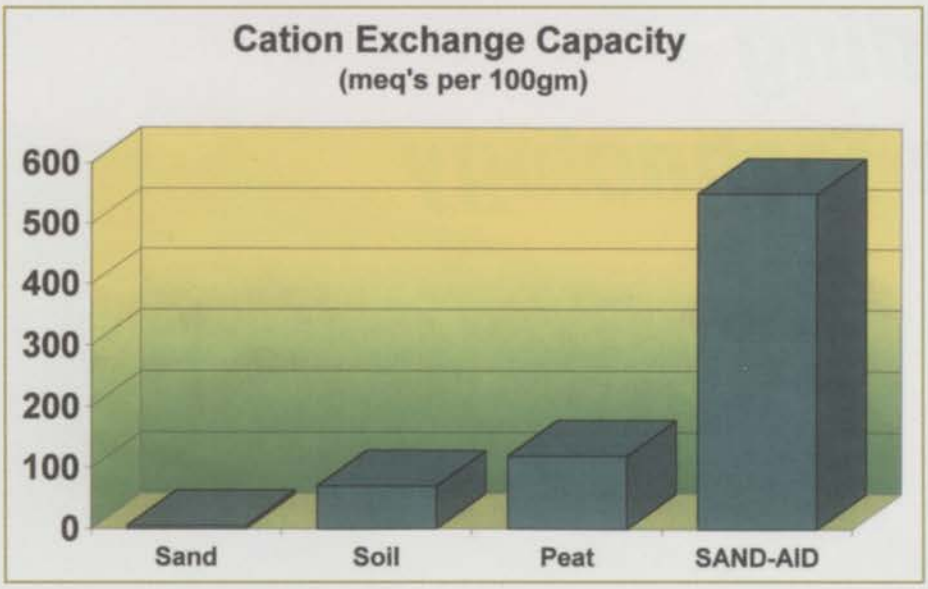
Product	Organism	Spores/g	Rate/ha	Spores/m2
Trichoflow® Turf*	*T. viride* *T. harzianum*	$100x10^8$	1.5kg	15 million
Trich-A-Soil®	***T. viride*** ***T. harzianum***	**$1000x10^8$**	**2.5kg**	**250 million**

**Trichoflow is a registered trademark of Agrimm Technologies, Christchurch NZ*

SAND-AID® is another product that has recently been introduced to Australian Turf Managers. It has been rigorously tested by leading Universities and consultants in the US, and has been an integral amendment to sand based greens in that country for over a decade.

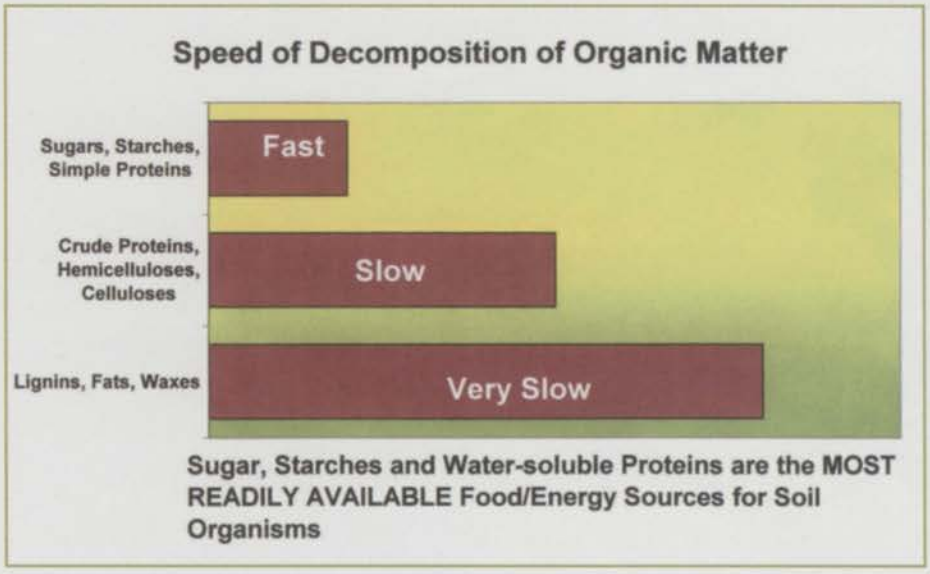
SAND-AID® is a specially selected and processed kelp meal designed for use in sand based greens to significantly improve nutrient and moisture retention.

Also due to the very high levels of plant sugars and starches, **SAND-AID®** will



significantly enhance microbial activity within a short period of time. This makes it perfectly suited to newly constructed greens and tees. It also decomposes very fast in comparison with most other organic amendments such as peat or composted chicken manures.

Peat and chicken manures contain lignins, fats and waxes, which can take up to 10 years to break down in the profile. This can have significant impacts on water infiltration rates and layering problems. **SAND-AID®** will break down within 12 months so you will never experience any potential layering problems from the use of **SAND-AID®**.



Both **SAND-AID®** and Trich-A-Soil® are sold exclusively through Chemturf. **SAND-AID®** is also sold premixed with various greens construction material in the Sydney area by M.Collins & Sons.

For further information contact ORGANIC CROP PROTECTANTS on

FREE CALL: 1800 634 204 or contact your CHEMTURF representative in your area.

Understanding Turf Tyre Technology

BY KRISTER WIENGREN

Curators and turf management personnel engaged in preparing and maintaining grass surfaces for golf courses, parks, stadia and sports areas, quickly learn that their tyred equipment can materially impact on the quality and condition of their prepared surfaces.

Tyre scuff marks and wheel rutts left behind on prepared turf and the simple difficulty in growing turf on soils which have been compacted by frequent tractor, vehicle or machine movements, are typical problems.

Perhaps surprisingly, many turf and grounds curators overlook the importance of the appropriate selection of tyres on their equipment, ranging in size from conventional tractors to specialised turf machinery, mowers and other implements.

Tyres have come to be regarded as just those round, black, inflatable pieces of rubber which support the running gear of most types of equipment.

Just as 'oils ain't always oils, it follows that tyres ain't always tyres'.

Lets start at the beginning;

Tyres are really large air tanks with air pressure inside. A tyre with low air pressure exerts minimal pressure on the ground. Air pressure in the tyre is approximately equal to the surface pressure. A tyre with a large footprint will deliver the weight of a machine like a tractor over a much larger area and if the tyre also has low air pressure, there is a dual benefit of a large contact area and a low pressure on the ground.

There is also the question of tractor

horsepower. There is no point in having large horsepower available if it cannot be transferred to the ground surface. It is clearly of more value to have a smaller tractor equipped with the right tyres to get the power on to the ground. However, this is not to say that a skinny tyre ballasted with water to dig its way into the soil to obtain a grip is desirable either.

Today there are tyres in use right around the world which provide both a low air pressure (often less than 0.7 bar or 10 psi) and a large footprint.

With a greater internal volume than a standard tyre they can be inflated to lower pressures to support the same weight.

These tyres are also minimising damage to soils caused by compaction and in turf applications in particular, are providing surfaces of superior quality.

At this point it is important to understand the essential differences between various types of tyre construction.

Diagonal versus Radial

Basically, there are two types of tyre carcass constructions – diagonal or radial.

The first diagonal tyre was made over a century ago but radial tyres have only been in the market since 1947. Radials now dominate the passenger vehicle market.

In forestry, agriculture, earthmoving and turf applications both types are represented.

Diagonal Tyres

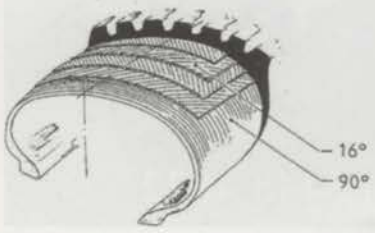
In this case the cord ply is diagonal from bead to bead. The different layers of cord ply cross each other in opposite directions, which makes the tyre walls strong and durable. A diagonal tyre is stiffer, has a smaller contact surface and a greater rolling resistance than tyres with a belt in the tread.

Radial Tyres

The radial tyre is a carcass of layers of cord ply going over each other from bead to bead. The tread is then strengthened with a belt of diagonal design.

The side walls are thinner and softer providing comfort but are generally more sensitive to damage. The soft tyre wall area in conjunction with the belt gives a larger contact area and lower rolling resistance. Other advantages are good properties at high speed, good grip and comfort on an even surface, low heat build up and low rolling resistance.

Radial Tyre



Bias Belted Tyres

This is a combination of pure diagonal and radial technology. The design uses the benefits of both without the disadvantages of either.

A strong and durable carcass is used with a belt under the tread.

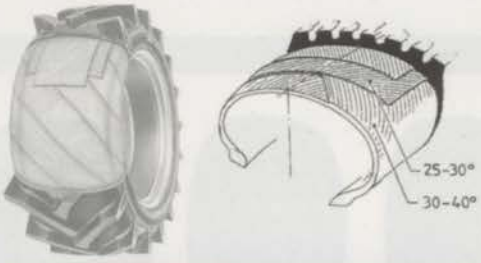
This provides a tyre with durable side walls and a tread which has a large surface contact area.

Key benefits are good all round properties, good grip and comfort even on poor surfaces, strong side walls and a carcass capable of withstanding low inflation pressure.

There is also good lateral stability, low rolling resistance on soft surfaces like turf, while damage to the carcass can usually be repaired. Durability is also excellent.

Remember that by spreading the load across a greater contact area, wide low profile tyres exert far less down force on the turf than standard tyres. This reduces the risk of marking the turf surface and compacting the soil structure below. Benefits to the turf are improved movement of oxygen and water ' better root growth and a reduced need for costly maintenance.

Bias Belted Tyre



Rubber Compounds and Tread Pattern

The rubber compounds used in tyres is a mixture of different rubber types and chemicals. For obvious reasons, specific 'recipes' are closely guarded secrets but tyres are given their desired properties by combining the various rubber compounds with certain additives.

The four main rubber compounds are:

1. Natural Rubber (NR)
   - from rubber trees
2. Styrene Butadiene Rubber (SBR)
   - synthetically produced from oil
3. Butadiene Rubber (BR)
   - synthetically produced from oil
4. Butyl Rubber (IIR)
   - synthetically produced from oil

Tyres are not constructed from rubber alone but also contain various additives, some of which are listed below:

- Carbon Black: This is used as filling material. It strengthens the rubber and improves its durability against tear damage and wear resistance. Carbon Black has much the same function as does sand in cement. The size, appearance and quantity of carbon black will

depend on the desired properties of the tyre.

- Oil is included as a softener and also facilitates the mixing of other chemicals.
- Protective Agents: designed to delay rubber degradation that may result from age, exposure to sun, oxygen, ozone and liquid fertilisers.
- Curing Agents: In order to change the physical characteristic of the of the tyre from plastic to elastic, the tyre is cured in the mould under high pressure and at temperatures of approximately 100 degrees celcius. Under these conditions the curing chemicals are activated and the tyre is cured. Depending on the size of the tyre, curing time may vary from about 20 minutes up to three hours depending on the tyre size.

Mixtures of tyre compounds and different additives allow the tyres to exhibit different characteristics and to be suited to a range of applications however, the different tyres generally offer a compromise between softness and durability. Because turf tyres spend the majority of their working lives on grass and at low pressures, they are generally constructed to a soft specification and will wear quite quickly on hard abrasive surfaces.

Tread Patterns

The tread pattern of a tyre can tell you a lot about a tyres function. Turf tyre (a) 'slick' will do virtually no damage at all to fine turf and is therefore ideal for use on ride-on greens mowers. Tyre (b) 'ribbed', whilst still kind to fine turf, it offers more steering control in undulating or slippery conditions than the slicks and may therefore be better suited to mowers operating under these conditions. Turf (c) 'flat diamond type pattern' has enough grip for driving and pulling work on turf but gets enough rubber onto the ground to spread the load and tyre impact and is therefore ideal for all fairway applications. Tyre (d) 'nobby' provides loads of grip and is perfect for the driving wheels on turf utility vehicles and on bunker rakes. Tyre (e) 'fat boy' allows the tractor weight to be distributed over a wide area and when combined with low inflation pressures the result is a tyre that has tremendous load bearing capacity but causes minimal soil compaction and turf damage.

Research

Turf surfaces are very sensitive to soil compaction.

The researcher F.G.J. Tijink (in a leading text on soil compaction published in 1994*) collected and analysed a large volume of data on wheel traffic over different soil types.

He concluded that to obtain minimum soil damage from tractor and implement traffic, the important issues where to use a tyre with low inflation pressure, low tyre load, low average ground pressure, low tyre stiffness, low wheel slip and a radial construction with low tyre lug dimensions.

Conclusion

Turf managers should be aware that it is important that they get the right tyres on their machines from the very beginning rather than being in the position of having to change them over because of problems with compaction, abrasion, slipping or expensive downtime. There is a wide range of turf tyres now on the market and most machinery manufacturers are flexible enough to allow you to tailor make the tyre configuration that will best suit your purpose.

**F.G.J.Tijink. Quantification of vehicle running gear in B.D.Soane & C van Ouwererk Editors. Soil Compaction in Crop Production. Elsevier Amsterdam pp 391-415*

Krister Wiengren is an Area Manager & Tractor Tyre Specialist for Trelleborg Wheel Systems Australia

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By John Neylan [Manager, Technical and Advisory Services, AGCSATech]

AGCSATech Research

With the tremendous support from turf managers and industry, AGCSATech has been able to commence turf variety trials in Victoria and Queensland. The Victorian site was sown in October and the Queensland site will be planted in December. The Victorian site consists of a bentgrass evaluation trial and a bentgrass collection trial. The Queensland site will consist of a couchgrass selection and collection trial.

AGCSAtech team hard at work.

Bentgrass just $2^{1/2}$ weeks after seeding plots.

Bentgrass Evaluation TRIAL

The objective of the trial is to evaluate the performance and maintenance requirements of the new strains of bentgrass compared to the established industry standards.

Varieties:

Dominant (SR1020/Providence)

L93

Pennlinks

Egmont

Penncross

A1

A4

G4

G6

Cato

SR7200 (Velvet bent)

"Suttons" (when seed becomes available)

Assessments:

1. Turf quality - monthly
2. Turf density - monthly
3. Incidence of disease and pests
4. Thatch depth - monthly
5. Wear tolerance – 4 times a year
6. Spiking tolerance – 4 times a year
7. Green speed

The trial was sown on the 17th October and has already been assessed for seedling vigour, disease and growth. (see table below)

Table 1: Average Seedling Vigour, Growth and Disease

VARIETY	Seedling Vigour (3/11/00)	Disease # of spots (9/11/00)*	Disease area affected (15/11/00)*	Growth (15/11/00)
Penncross	7.3	0.0	6.7	7.7
Egmont	7.3	0.0	10.0	7.7
A1	4.0	0.0	13.3	6.7
A4	6.7	1.7	10.0	7.3
G4	5.0	0.0	8.3	7.0
G6	7.0	0.0	11.7	8.0
Cato	6.7	0.0	13.3	7.3
Pennlinks	6.0	0.0	10.0	7.3
L93	7.3	0.0	15.0	7.3
Dominant	7.3	0.7	15.0	7.7
SR7200	6.7	1.3	11.7	7.3
S'Dev	1.37	1.14	7.42	0.66

* **Disease identified as** Pythium spp.
Ratings for seedling vigour and growth : 0 = worst 9 = best

Additional results will be forthcoming in subsequent editions of Australian Turfgrass Management magazine.

BENTGRASS COLLECTION TRIAL

The aim of this project is to develop a bentgrass variety suited to Australian growing condition by selecting from local ecotypes in well-established greens.

The project will involve;

- Collecting bentgrass types as 50mm plugs from putting greens. The selection criteria at this time will be based on what the individual clubs consider to be "good" types. Desirable characteristics include:

- High density
- Tolerate low mowing
- Have good putting characteristics
- Minimal spiking
- Good disease resistance
- Good competition against Poa annua invasion
- Dense root system
- Heat tolerance

The plugs will be grown in pots then planted into field plots at our Victorian trial site at the Kingston Heath Golf Club for detailed assessment.

Disease of the Month

Pythium spp.

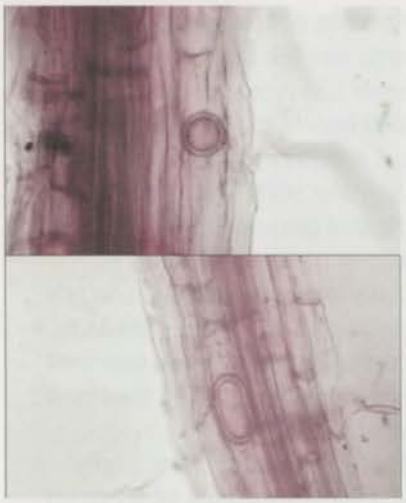
With the onset of some early warm and humid weather, Pythium spp. Diseases are becoming prevalent.

Pythium spp. Will attack all turfgrass species, however, the cool season grasses are most commonly damaged. Pythium spp. Diseases occur throughout the year under a wide range of climatic conditions, the most obvious and severe damage caused during hot, humid weather.

Pythium spp. Can affect all parts of the plant and appear as foliar blights and root rot. Foliar blights occur suddenly as circular spots 2-5cm in diameter. On putting greens the patches will start off very small but can expand rapidly under certain conditions. Other symptoms that may be associated with foliar blights are grey "smoke rings" and orange/bronze colouration. When the humidity is high, the collapsed leaves can become covered with a mass of fugal hyphae.

Crown and root rots occur frequently in bentgrass putting and bowling greens. Symptoms are generally nondescript apart from a general decline in turf health. Disease may occur at any time during the growing season and symptoms may first appear as small, diffuse yellow patches. Unlike foliar blights there is no mycelium present. However, the root system is often greatly reduced in volume and loses vigour.

Wet conditions are required before Pythium spp. can cause extensive damage. Foliar disease is favoured by;



Pythium spp. seen here in root sections.

- day temperature between 30 and 35° C
- night time temperatures above 30° C
- high humidity
- high nitrogen fertility

Fungicides are generally required to control Pythium diseases. Preventative fungicide applications during periods of high temperatures and humidity if often warranted, particularly if turf areas have a history of the disease.

The following organisations provided materials to assist the AGCSA in establishing the above trials. The AGCSA is grateful for their support and wishes to thank the following : Globe Australia, StrathAyr, Evergreen Turf, Heritage Seeds, Continental Purchasing Group, Triordia Pty Ltd, Green Group, Chemturf, Valley Seeds, T&I, Wrightsons, the Kingston Heath Golf Club.

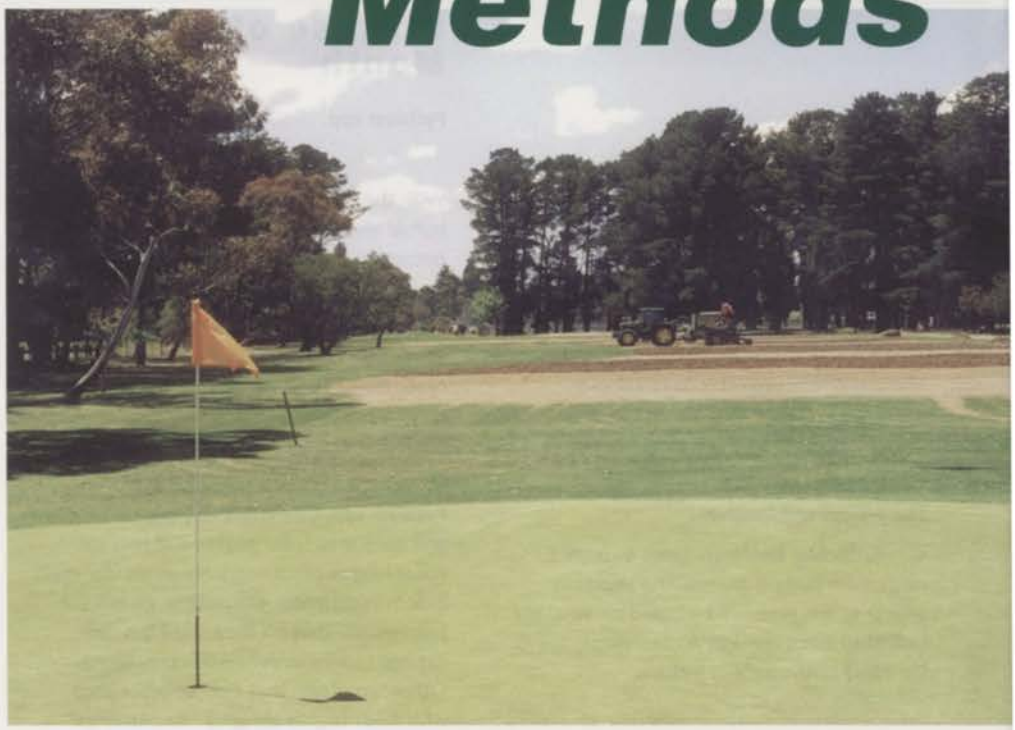
research

BY PHILIP FORD

Comparison of Couchgrass Establishment Methods

The Victorian Golf Association Turf Research and Advisory Board initiates and funds turf research trials with potential benefit to Victorian golf clubs. A previous project that ran from Summer 96/97 until mid-1999 investigated grasses for fairways maintained under low inputs, especially low or no irrigation. In late 1999 each club committee and each Golf Course Superintendent was sent a colour brochure detailing the results of that work.

The results showed that once fully established there should be no direct loss of couchgrass due to lack of water. The common couch selection 'Legend' and the hybrid couch cultivar 'Santa Ana' were shown to have the best fairway quality, drought tolerance, short winter dormancy, good competitiveness against weeds and suitability in either a 'Pure Couch' situation or a '2 Grass' fairway (where Poa annua provides the winter cover). The common couch selection 'Wintergreen' was also excellent. 'Legend' couch produces less thatch than 'Santa Ana' and 'Wintergreen' however, and the trial concluded that the 'Legend' (previously known as 'C1' couch) was the best choice for clubs wishing to maintain low input fairways. The problem facing clubs wishing to convert to Legend (or Santa Ana or Wintergreen) fairways is the decision on how best to establish the new surface. Over the summer of 1999/2000, the Turf Research and Advisory Board initiated and funded a trial at Ballarat Golf Club to investigate these issues. This report summarises the findings.



SOME BACKGROUND

Couchgrass varieties are established by planting stolons of the parent plant, in an operation known as 'chaffing' or 'sprigging'. By planting stolons the club is ensured of creating a new turf cover that is perfectly uniform, being a clone of the parent plant. Why isn't couch seeded? There are three reasons:

a) couch is a cross-pollinating plant, so the production of seed involves a sexual crossing of two parents. Every seed, then, is a unique and individual genotype and the resulting turf sward will have colonies of different couch types (a Heinz 57 variety fairway).

b) turf researchers have not put the time and money into breeding uniform, high quality seeded couches to the same extent as their work on bents, ryegrasses and fescues. One company that has, Seeds West of Arizona has bred an excellent seeded couch (Princess) that did well in our earlier trial work, but the seed quantity is so limited that commercial availability may be years away. All other seeded couches we trialed had very poor fairway quality, although they may have a place in the rough or light rough.

c) some couches are hybrids between Common Couch and South African Couch. Examples are Santa Ana, Tifgreen (328), Tifway (419) and Tifdwarf. Hybridisation was induced by the plant breeder, but the resulting chromosome number is 27 - this can't be divided by two, so the plant can't produce either pollen or ova. In other words it is sterile and won't seed. It may have seed heads, but they are not fertile.

So couchgrass establishment on a fairway will usually involve sprigging - getting some stolons from somewhere, and planting them into the fairway in early summer. Generous watering will see those sprigs strike and a full couchgrass cover will follow in 6 - 10 weeks. The key ingredients to sprigging success are:

a) removing competition from the existing fairway grasses (eg: glyphosate application)
b) ensuring adequate sprig quantity (at least

1 cubic metre of chopped sprigs per 1000 square metres of fairway)

c) good sprig-to-soil contact (eg: cultivating sprigs into the soil, or spike rolling the sprigs in).
d) keeping soil very moist until the sprigs strike (especially the first week)
e) maintaining generous irrigation and fertilizer inputs until the couch has reached 100% cover.

Sprigging is always a compromise between speed of coverage, and ensuring the success of the operation. Cultivating the sprigs into the soil, followed by rolling, ensures that a lot of sprigs are buried which protects them from drying out and blowing away. The deeper they are buried, however, the longer they will take to get to the surface. Coverage will be quicker if the sprigs are not cultivated in, but a hot day with a strong northerly wind could ruin the whole job by blowing most of the sprigs away, and dehydrating the ones that are left.

There is now a long history of fairway conversion to couchgrass in this state (and throughout Australia), and a great variety of techniques have been employed.

Some clubs (eg: Anglesea, and more lately Waverley Golf Clubs) have turfed (sodded) the fairways, using either sod purchased from a turf farm, or cutting and transplanting areas of turf on the course. This method can produce excellent, fast results but is usually expensive.

Other clubs (eg: Keysborough Golf Club) have encouraged the 'native' couch already present in the fairways by judicious use of glyphosate and atrazine over several seasons.

Other clubs have oversprigged existing fairways with Santa Ana, and let time and the competitiveness of the Santa Ana achieve full cover over a number of years. This has the advantage of not losing any play. Various machines have been used - for example John Spencer (GCS, Huntingdale Golf Club) built an oversprigger that has been used at several courses throughout the state.

Other clubs (eg: Riversdale, Eastwood and Northern Golf Clubs) have opted for a conversion using conventional cultivation, taking the fairway out of play and making the hole a short Par 3, or doing half the fairway one year, and the other half the following year. These conversions can be disruptive, especially as the process of conversion of the full 18 holes might take a few years. The results are decisive, however, as the grow in will usually result in 100% couch cover in that summer.

Couch oversprigging, where the sprigs are drilled into rows into the fairway without cultivation, has obvious potential benefits. Peter McMaugh (Turfgrass Scientific Services, Sydney) probably more than anyone else in Australia has promoted this technique by building a machine that can do the job efficiently and cost effectively. His machine slices a neat drill row into the existing fairway turf, into which sprigs are pressed and rolled into place. Other contractors have

Photo 1: Oversprigging Machine.

Table 1: Temperature details for Summer 99/00 at Ballarat, including number of morning minimums below 10 C.

	Av. Max	Av. Min	Range	Below 10°C
Dec	22.8	9.7	2 to 34	18 days
Jan	24.2	11.2	6 to 34	10 days
Feb	28.8	14.2	6 to 40	6 days
Mar	24.8	11.7	5 to 35	9 days

produced variations on this machine. Our trial used a machine developed by Tony Sinclair, of Turf Renovations (Aust). *Photo 1* shows the machine at work, and the finished surface in comparision with the cultivated plot alongside.

There are a number of advantages with the oversprigging machine:

a) First, it avoids the need for cultivation. Cultivation can be a real nuisance - it leaves huge clods of thatch that make the surface bumpy. It might also bring up underlying rocks. It will seal over drains that might have been working quite well. It might leave wheel marks that will show up for years in the fairway. Another potential problem is the fairway may not provide the surface run-off of previous years - this water might enter and waterlog the profile instead of running off.

b) Oversprigging is quick and relatively cheap. A one hectare Par 5 hole could be planted in half a day or so, for a cost of around $1,500 (plus the cost of sprigs). The only preparatory work would be to spray out the fairway with glyphosate, and mark any sprinkler heads.

c) Oversprigging can potentially allow clubs to sprig one day, and open the fairway for normal play the next. This is talked about, but rarely done. The oversprigged area still needs heavy watering just after planting, and possibly for the first week or so, so most clubs keep the fairway out of play for several weeks at least, if not for the whole time it takes the couch to fully cover.

d) Oversprigging can potentially save water. Because the sprigs are pushed into the topsoil there should be less chance of them dehydrating - however clubs that have oversprigged have usually used as much water as when conventional sprigging was done.

On the negative side, it is known that the oversprigging method will result in slower couch coverage. The question is 'how much slower?' If it's too slow then maybe the fairway won't cover fully in a single summer.

The aim of this trial, then, was to gather data on the establishment speed of oversprigged couch vs a conventional sprigging operation. A secondary aim was to evaluate two herbicides, simazine and Ronstar, for their performance during couch establishment.

The trial was done at Ballarat Golf Club for a particular reason - if the establishment worked in a Ballarat summer, then it would work anywhere. Table 1 shows what sort of a summer we had - December and January were very cold, with many mornings below 10°C. February, on the other hand, was very hot.

TRIAL SET-UP

A trial involving the two couch varieties 'Legend' and 'Santa Ana' establishment by conventional cultivation and by oversprigging was planted on 29th November, 1999 at Ballarat Golf Club. Treatment plots measured 35m x 10m, with each treatment plot being replicated three times. The trial area involved the complete planting of a Par 4 fairway (the 3rd hole). This fairway had previously been killed by glyphosate application.

Seeded couch at 10 days

Seeded couch at 40 days (100% cover by 7th January)

The Conventional sprigging treatment involved two cultivations, first by rotary hoe and then power harrows (Roterra). A measured quantity of sprigs (around the industry standard, at 1 m^3 of chopped sprigs per 700m^2 of ground) was then spread on the surface by hand, power harrowed again and the surface rolled with a heavy steel roller.

The Oversprigging treatment involved the use of a commercial machine built by Turf Renovations, Australia. This custom built machine uses a slicing coulter and Baker boots to cut and open a slot in the uncultivated soil, and sprigs from a hopper are then dropped into this slot (*see Photo 1 opposite*). The slot is then closed by a roller, and the surface is then rolled again with a heavy steel roller.

The same quantity of sprigs was used in both processes and their post-establishment watering and fertilising was also the same. Two plots of a seeded couch (Common Hulled couch) were sown on the same day, one into cultivated soil and the other oversown into uncultivated ground. These were done to give a generalised comparison of seeded vs sprigged couch establishment.

The two herbicides oxadiazon (Ronstar at 200kg/ha) and simazine (3.5 l/ha) were applied and watered in the day after sprigging. Each herbicide was applied as a single strip across the plots, so that each treatment had a herbicide-treated strip for comparison.

ASSESSMENT, RESULTS AND DISCUSSION

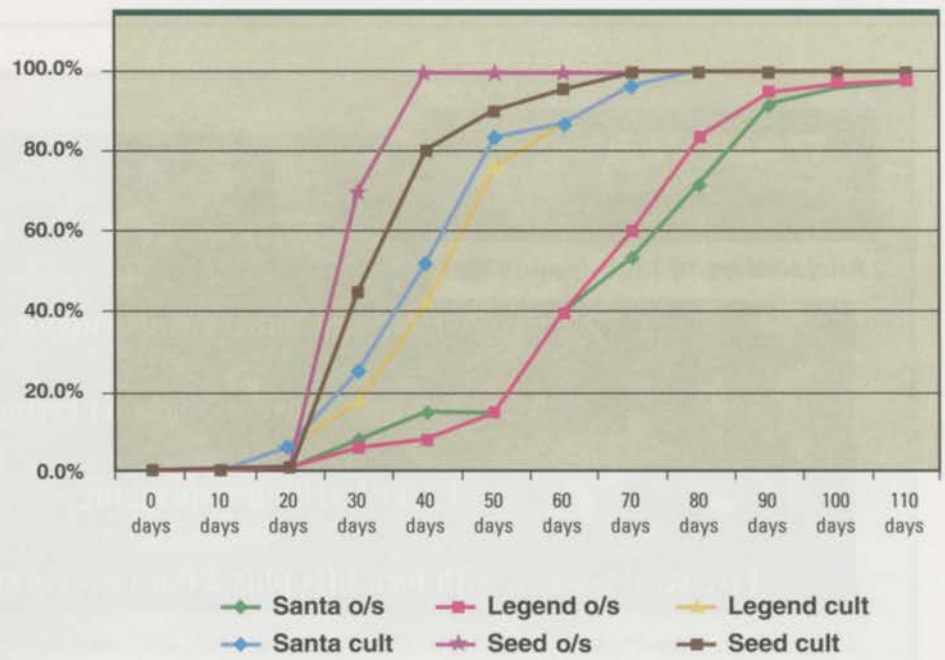
A. Seeded Couch

1. Seeded couch has extremely rapid establishment, around 40 days to full playing condition compared to 60 days for conventionally sprigged couch, and 80-90 days for oversprigged couch. Unfortunately the quality of seeded couch varieties is still vastly inferior to the improved varieties (like Legend and Santa Ana) that require sprigging. Note: Only single plots of seeded couch, so no statistics could be done on them.
2. The seeded couch sown into uncultivated ground did much better than that sown into cultivated ground. Clubs thinking of using a seeded couch in the roughs should get a better establishment result by overseeding with a sodseeder, rather than cultivating the soil first.

B. Sprigged Couch

3. In nearly all other past establishment trials Legend has had a much faster establishment rate compared to Santa Ana, but in this trial at Ballarat there was no significant difference in establishment rate between Legend and Santa Ana.
4. Conventional cultivation resulted in establishment rate to 'Open for Play' status (over 80% groundcover) at around 60 days (from 29th November through to opening on 28th January). By this stage the oversprigged plots were only 40% covered.
5. Conventional cultivation achieved a 100% establishment in less than 80 days (from 29th November until 17th February).
6. The soil cultivation has resulted in wheel rutting, however, which may create ongoing problems with fairway smoothness. Many clubs who have cultivated fairways have found this. It is essential that if a club is choosing the conventional cultivation method of couch establishment that wide turf tyres are used on machinery, and that a lot of care is taken to avoid wheel ruts.
7. Oversprigging resulted in establishment rate to 'Open for Play' status (over 80% groundcover) in 80-90 days (around 28th February, just on a month later than the conventional cultivation plots). It may be possible to open these fairways on a tee-up or preferred lies basis much sooner, however, because the ground has not been cultivated and is firmer.
8. The only couch that struck in the oversprigged plots were those sprigs that the machine pushed into the drill lines in the soil - all surface sprigs died. It may be possible to improve establishment rate by spike rolling after oversprigging to push some of the surface sprigs into the soil, or by ensuring more sprigs end up in the drill lines and not left sitting on the surface. The depth of drilling could also be looked at.
9. None of the oversprigged plots actually achieved 100% cover by the end of the trial (Day 120, 29th March), even though they had enough cover (over 80% groundcover) to open the fairways by around the 28th February . The lack of a full, 100% groundcover is a nuisance because it will result in more winter weed invasion, and also because you can't really switch to a low irrigation/low fertilizer regime until full couch cover has been achieved.

Graph 1: Establishment rates of couchgrasses



Assessments of establishment rate were made each ten days. The results are summarised in Table 2 and Graph 1.

Table 2: Percentage groundcover of couchgrass, Ballarat Golf Club

	Santa o/s	Legend o/s	Legend cult.	Santa cult	Seed o/s	Seed cult.	LSD
0 days	0.0%	0.0%	0.0%	0.0%	0%	0%	0.0%
10 days	0.0%	0.0%	0.0%	0.0%	0%	0%	0.0%
20 days	0.8%	0.8%	6.7%	6.0%	1%	1%	2.4%
30 days	7.3%	5.7%	17.7%	25.0%	70%	45%	16.5%
40 days	14.3%	8.3%	43.3%	51.7%	100%	80%	16.5%
50 days	15.0%	14.3%	76.7%	83.3%	100%	90%	5.9%
60 days	40.0%	40.0%	86.7%	86.7%	100%	95%	14.5%
70 days	53.3%	60.0%	96.0%	95.7%	100%	100%	9.4%
80 days	71.7%	84.0%	100.0%	100.0%	100%	100%	15.7%
90 days	91.7%	95.0%	100.0%	100.0%	100%	100%	7.2%
100 days	95.3%	96.7%	100.0%	100.0%	100%	100%	3.8%
110 days	97.3%	97.3%	100.0%	100.0%	100%	100%	5.0%
120 days	98.3%	98.0%	100.0%	100.0%	100%	100%	0.6%

o/s = oversprigged cult = conventional cultivation

10. The maximum and minimum temperatures for Ballarat are significant. The conventionally cultivated plots achieved full cover in 60 days of mostly cool weather, with many cold nights (in fact 28 of the 60 days had a minimum below 10°C). The oversprigged plots took an extra 20-30 days to reach the same cover (basically all of February to catch up) and those February days were much hotter, as were the overnight minimum temperatures. This highlights the much higher establishment rate of the plots that had been cultivated.

C. Herbicide Treatments

11 Simazine resulted in inadequate weed control and excessive phytotoxicity to the couch and should not be used in sprigging operations. All groundcover figures at 60 days were significantly retarded compared to the untreated plots (*see Table 3 and Photo 4*). By Day 80 the retardation was not significant, but weed control by the simazine had broken down by then in any case.

12. Ronstar slightly retarded couch establishment, although only one reading was significant (*Legend oversprigged at Day 60 - see Table 3. See also Photo 5 of Santa Ana cover with and without Ronstar at Day 50*). The weed control provided by Ronstar did not result in improved couch establishment rate at this site. At its current cost Ronstar's use should only be considered in areas where a heavy weed burden is expected.

    Where light weed burdens are expected the competition caused by an unimpaired couch establishment rate is probably a better weed control option than Ronstar.

13. Regardless of whether couch retardation was significant or not, no single plot of either Ronstar or Simazine resulted in higher couch groundcover figures, and that is the whole point of their application.

10. The maximum and minimum temperatures for Ballarat are significant. The conventionally cultivated plots achieved full cover in 60 days of mostly cool weather, with many cold nights (in fact 28 of the 60 days had a minimum below 10°C). The oversprigged plots took an extra 20-30 days to reach the same cover (basically all of February to catch up) and those February days were much hotter, as were the overnight minimum temperatures. This highlights the much higher establishment rate of the plots that had been cultivated.

RECOMMENDATIONS

The trial has shown that oversprigging is a viable establishment technique with some advantages over conventional sprigging into cultivated ground. The main advantage is reduced disruption to the course and the fairway surface. The big disadvantage is the extra time required to achieve full couch cover - around 80-90 days compared to 60 days where the fairway had been cultivated, plus the possibility that the couch won't have fully covered by the end of the summer weather.

The trial also found that simazine causes excessive retardation of the couch establishment, while providing inadequate weed control. Ronstar will provide excellent weed control, but there was evidence that it too caused some slight retardation to couch establishment rate. Ronstar should be avoided unless the fairway being established is known to have a heavy weed seed bank.

The recommendations in this report are based on a set of trials and conditions as laid down within the report and should not be taken as a

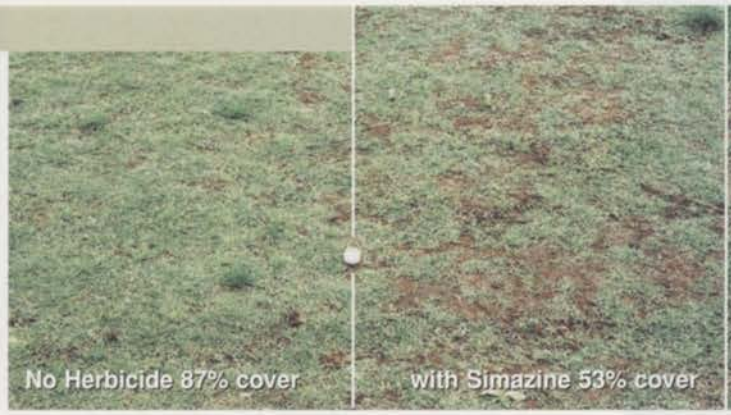


Photo 4. Legend (cultivated) Day 60

Photo 5. Santa Ana (cultivated) Day 50

decisive, or conclusive recommendation.

Each club and each fairway are different. It is only hoped that this research assists clubs and superintendents to make relevant decisions that are best suited to their club and to their particular conditions.

FUTURE RESEARCH

This research is funded for another summer. This will give us a chance to examine a few more unknowns. Can oversprigging be done with minimal irrigation? Can an oversprigged fairway be brought back into play the day after planting or will the traffic retard the couch too much? Can the sprig strike rate of oversprigging process be improved? We hope to answer these questions by this time next year.

At Day 60	Santa o/s	Legend o/s	Legend cult.	Santa cult.
Untreated	**40%**	**40%**	**87%**	**87%**
Plus simazine	25%	16%	53%	75%
LSD (P=0.05)	12%	3%	29%	7%
Reduction in cover	-15%	-24%	-34%	-12%
Plus Ronstar	37%	32%	78%	73%
LSD (P=0.05)	7%	7%	19%	36%
Reduction in cover	-3%	-8%	-9%	-14%
At Day 80	Santa o/s	Legend o/s	Legend cult.	Santa cult.
Untreated	**72%**	**84%**	**100%**	**100%**
Plus simazine	62%	69%	93%	98%
LSD (P=0.05)	60%	30%	7%	7%
Reduction in cover	-10%	-15%	-7%	-2%
Plus Ronstar	67%	76%	100%	98%
LSD (P=0.05)	26%	15%	n/a	7%
Reduction in cover	-5%	-8%	0	-2%

Table 3: Effects of herbicide application on couch establishment rate. Figures shown are Percentage Groundcover, at Day 60 and again at Day 80. A herbicide treatment must differ from the untreated plot groundcover by at least the amount shown as Least Significant Difference (LSD) to be statistically significant.

ACKNOWLEDGEMENT

The Victorian Golf Association Turf

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The Association also records its thanks to the members of the Turf Research & Advisory Board and, in particular to Phillip Ford who has designed and managed the project and prepared the reports.

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Cutting Reels: The Daily GRIND

BY GREG TURNER

To understand the "optimal" cutting performance of today's reel-type mowing equipment, it is important to understand the two primary components of reel cutting units, how they are made to work together, and what the manufacturers of the equipment recommend when the units get dull. Sharp cutting units are critical when cutting grass at low heights and if not properly maintained, the potential for sub standard "quality-of-cut" issues are greatly enhanced.

The basic concept of reel design has changed little over the years regarding the two primary components of a reel, the reel blade and a bedknife, and all manufacturers make these parts approximately the same way [*see Figure 1*]. However, what has changed is the expectation of turf conditions within the golf industry. This makes the job of the Technician and Superintendent much more challenging and proper reel maintenance will play a significant role in the overall optimum efficiency of the machine.

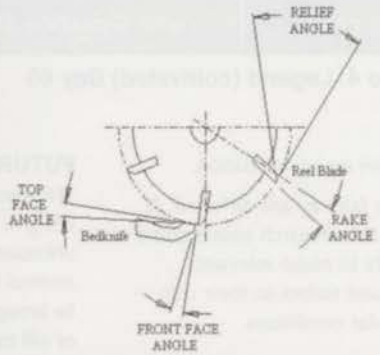


Figure 1: Illustrates the various angles of the reel blade and bedknife.

CUTTING UNIT DESIGN

Let's first talk about the two parts that make up a reel cutting unit: the bedknife and the reel. As you can see from the diagrams, the bedknife has a "top" and "front face" relief angle. These angles are there for specific reasons, and when regrinding to a sharp edge, it is important to put the angles back in.

- The top relief angle provides an escape route for the grass clipping, which ensures that the cut grass is discharged during the cutting process. As this angle diminishes through use and the surface area that the reel blade passes over increases, the resulting actions of pulling and tearing, weaken the plant structure, making it much more susceptible to disease and other stresses.
- The front angle assures that the front edge will stand the blades of grass up in position, allowing for a smooth, exact height of cut with minimal 'stragglers'.

The reel blade is also associated with two angles called the "rake" and "relief" angles:

- The rake angle is the angle the reel blade is welded in the spider. It is fixed from the manufacturer and ensures that the front cutting edge is always forward of the blade body, which in turn allows the leading edge to cut, not push, the grass.
- The back "relief" angle on the reel blade ranges from 20-45 degrees, and approximately 80% of the blade is removed. The OEM reel blade configuration has two basic process designs: 1) Fairway/Rough mowers have a much thicker blade design and a "ground-in-relief" process is used and 2) Greens/Tees mowers have a thinner blade design, which utilizes a "milled-in-relief" manufacturing process. Recently, some OEM's have "ground-in" additional relief on these milled blades for optimum cutting unit performance.

How important is the back relief angle when reconditioning

your reels? The various manufacturers request it for a number of reasons and among the most important is that it minimizes the amount of metal that passes over the edge of the bedknife. This reduces friction between the reel and bedknife, so whether you are making light reel to bedknife contact or not, this OEM design:

1. Reduces stress on the engine and hydraulic systems;
2. Maximizes the horsepower for the traction unit;
3. Reduces the amount of horsepower required for reel rotation by up to 50%;
4. Ensures a longer wear life of the cutting unit as wear rates are maximized;
5. Allows backlapping to be a viable option for increasing quality-of-cut;
6. Increases fuel efficiency.

Also, manufacturers make their reels perfectly cylindrical in two planes. This means that all the reel blades are on the same cutting circle, and the reel is equal in diameter from one end to the other. When matched up with a perfectly flat bedknife, the cutting unit will adjust properly, equal heights of cut can be expected, and a premium "after-cut appearance" is achieved.

What happens when new cutting units are put into use? Typically, the quality of cut begins to deteriorate [*see Figure 2*] and corrective action must be taken. Consistency of cut is a major problem throughout the turf industry and not having a set maintenance schedule for the cutting units can be a detriment to the "appearance" of the turf. When making a $10,000 – $50,000 investment in a piece of mowing equipment, there will be three primary activities that will maximize your investment, optimize cut quality, and maximize cutting unit efficiency:
1) Adjustment 2) Backlapping
3) Grinding.

ADJUSTMENT

As the sharp edges of the cutting unit slightly round off, the gap clearance between the reel and bedknife becomes greater. Adjustments are made to close this gap and extreme care must be taken. There is a tendency to over tighten when the units are not cutting correctly, and this will cause multiple problems in the field. Remember, the bench setting clearance between the reel and bedknife may be different when the cutting units are on the ground and in operation. The ground can push up on the bedknife, closing the gap between the two parts, and if cutting in dry conditions, the metal expansion caused by friction between the two parts coming together will also close this gap. Minor daily adjustments are much better for the equipment than major adjustments made when the units aren't cutting well. Over adjustment will cause the reel to 'climb over' the bedknife (rifling the knife), putting undue strain on drive mechanisms, and resulting in premature wear of the cutting unit and related components. The ideal setting for reels is at 0.002 inches (0.05mm) clearance between the reel and the bedknife, as this will allow for clearance variation when the ground up-pressure and heat effects of field operation occur.

BACKLAPPING

Before the quality of cut can no longer be maintained through adjusting, another step is to backlap the cutting units. The backlapping process is part of a preventative maintenance program where the objective is to keep the unit sharp and in the "optimal cutting range". If scheduled regularly, adjusting and

backlapping will allow for a premium quality of cut for an extended period of time, and the potential for problems is significantly reduced. While backlapping will hone the edge, it should NEVER be used to sharpen extremely dull or out of shape reels. If it takes more than 5 minutes to lap your reels, you will most likely need to grind your cutting units because:

1) The edges have rounded off severely enough where lapping will be ineffective in generating an edge.
2) The OEM "relief" on the reels is diminished and lapping is not a viable option. [*see figure 3*] The relief area on the reel blade provides an area for the lapping compound to adhere to. This enables the grit to be suspended on the reliefed area and pushed between the reel and bedknife, thus "effectively removing metal". On a flat ground reel or one that has lost the original relief angle, there is so much surface area and metal to remove on the reel blade that it makes the lapping process ineffective and time-consuming.

Most cutting units now come with a backlapping mode option on the machine and if utilized properly, it is a quick, effective way to keep your cutting units at their best.

REEL GRINDING

Between adjusting, backlapping, and cutting, not only does a coning effect occur on all cutting units [*see Figure 4*], but the original angles on both the bedknife and the reel is lost. The grinding process is a "reshaping" process and you can bring your cutting units back to "OEM –Factory New" condition. By checking the cutting edges of the reel blades and bedknives, you can visibly see if the "relief" is gone from the reel blades, and you can physically inspect them to see how rounded off and dull they are.

There are three primary grinding objectives once the decision has been made to grind:

- Grind to produce a sharp edge.
- Grind to remove any "cone-shape" that has developed through use.
- Grind the specified relief as originally designed from the OEM.

REEL PREPARATION

There are certain grinding procedures that should always be followed regardless of whether a "Manual – Single Blade" style grinder or a "Spin" style grinder is used.

1. Remove the bedbar/bedknife assembly from the cutting unit.
2. The reel should be cleaned by removing grass and debris off of the blades and bearing area. Inspect for any broken or bent blades - if broken, they should be repaired or replaced.
3. Front and rear rollers should be inspected and checked to see if the bearings are properly adjusted and in good condition.
4. Reel bearings must be checked to see if they are adjusted correctly (all manufacturers have a specification for bearing pre-load). There should be zero "end-play", and no movement up or down. The reel should spin freely in the frame with no "sticking" spots.
5. If for some reason the frame is out of shape or twisted, it should be straightened or replaced before grinding.

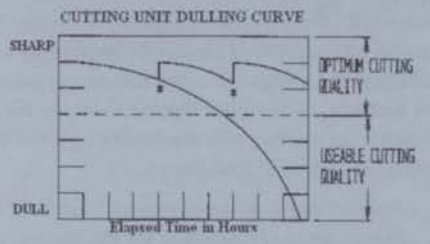


Figure 2: Without taking corrective action, this graph shows how the "quality-of-cut" deteriorates over time. Not that corrective action taken while still in the "Optimum Cutting Quality" [denoted by the *] will maintain execptinal levels of cut quality.

REEL ALIGNMENT

The next step is putting the cutting unit into the grinder and aligning the reel shaft parallel to the travel of the grinding wheel. There are some grinders that provide a dial indicator or digital gage for this alignment task, and this

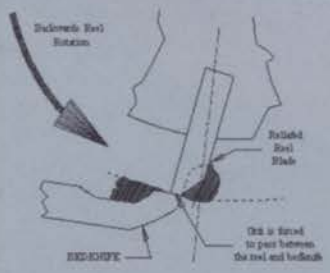


Figure 3: This image illustrates that lapping compound adheres to the relief portion of the reel blade and the abrasive grit is pushed between the reel and the bedknife.

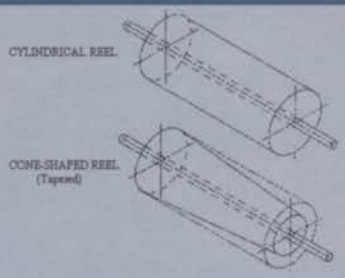


Figure 4: All reels eventually become cone-shaped [tapered] with use. Care must be taken if twisting the bedknife or adjusting rollers to compensate for a coned reel. This may not only generate undue stress on the bedknife, bearings, and frame, but cna alter the aftercit appearance of the turf.

Backlapping is part of a preventative maintenance program.

will ensure the highest quality end result.

If the grinder does not have such a tool, you should measure the reel to see if it is coned. This can be done by using either a "T" ruler (a pocket ruler that has a movable clip). Simply hold the ruler tight against the blade at one end of the reel and slide it down until it touches the center shaft of the reel. The "T" or clip should be touching the top of the blade, and will stay in place until you read the dimension. Repeat this step on the other side of the reel on the same blade. This will tell you exactly how much out of shape your reel is. Once you begin grinding, you will have to compensate by grinding one side of the reel more than the other, and the best procedure in attempting to remove the taper will be to measure the reel several times during your grind process. It will take time to grind the larger side down to get a consistent grind across the length of the reel, but removing taper will be critical to the adjustment process and the "aftercut appearance".

GRINDING THE REEL

Reel grinding will restore the cylindrical shape of the reel (providing the alignment or measuring steps were followed), as well as sharpen the leading edge. There are two types of grinders being used today:

Single Blade Manual Grinders that put full relief angles on reel blades. These grinders require the operator to do one blade at a time. It takes longer to grind, and there is risk of not grinding the same amount off of each blade. This can cause a high/low blade problem that will necessitate backlapping to assure that all blades wind up on the same cutting circle.

Automatic Spin Grinders free the technician to perform other tasks while the machine sharpens the reel. These machines assure that all reel blades are cylindrically ground to be on the same cutting circle. There are spin grinders that are capable of the secondary relief grind process in one setup, and there are also "automatic-indexing" spin/relief grinders. There are other "spin-only" grinders that require a second machine or tool for the relief process.

Regardless of whether you are using a manual machine or a spin grinder, the best performance will result by returning the reel to its original shape – sharp, cylindrical in two planes, and reliefed.

GRINDING THE BEDKNIFE

Every time you grind the reel you should also grind the bedknife. The following steps are the proper procedures to follow when replacing or regrinding a used bedknife:

1. When replacing a bedknife, use a wire brush or power washer to thoroughly clean the bottom of the bedbar assembly. Do not use a hand held grinder as this could dish-out the bedbar, resulting in excessive bedknife material being removed when grinding to a straight edge.
2. Inspect the bedbar for flatness and distortion with a high quality straight edge. If it is warped or damaged, replace it, or in some cases it is feasible to grind the bedbar surface straight and true.
3. When replacing a bedknife, start refastening from the middle screws out to the end, following torque recommendations of the OEM. This will prevent "load" on the bedknive, assuring a straight grind.
4. Make sure you grind both new and used bedknives to the same angles specified by the OEM. Since all angles are based on the bottom surface of the bedknife, a magnetic based angle gage will assist in finding the correct grind angle, and on some bedknife grinders, angles can be set by using built-in gages on the machines.
5. Control heat buildup so it never exceeds a comfortable touch.
6. Always pass off the ends of the bedknife for a uniform grind.
7. Finally, sparking out will result in the most uniform grind possible.

The challenges of new grass strains and the newer technology of mowing equipment have taken the simple science of cutting grass to another level. When considering the ultimate objectives of having your cutting units function the best that they possibly can at all times, a set maintenance schedule for the reels is a must. If you follow the right procedures, and follow the OEM recommendations, your equipment should meet the "quality-of-cut" expectations that you and your club can appreciate.

Greg Turner is a Sales Manager with Foley United.

By Greg Buckingham

Plant risk assessments:

KEEPING YOUR STAFF AND YOURSELF SAFE?

"If it rattles, clangs, screeches or bangs either pull that lever or press that button. By the way, keep away from that 'bit', it'll cut your leg off".

Have you either given, or received similar instructions in relation to the operation of an item of Plant. If you answered yes, you would be well advised to establish a strong bond with a lawyer who deals in industrial crime and who would be willing to represent you in a court of law.

Note: Plant is a general term for machinery, tools, appliances and equipment. Plant can be tractors, mowers, seed drills, sprayers, pumps, backhoe, hoist, powered hand tools,rollers.

As you sit around the lunch room reading and discussing the information provided above I can hear the banter, laughter and name calling as to which people might be summoned and what item of plant has been bastardised to such an extent as to warrant a mention.

So in the event of an accident, would you be able to stand in a court of law and clearly state that your actions have in no way contributed to the accident.

As a pre cursor to the subject of 'Plant' it is worthwhile mentioning that the term 'Due Diligence' needs to be clearly understood.

What is due diligence? At its simplest, due diligence means 'take care'. In the workplace, it means taking every precaution reasonable in the circumstances to protect the health, safety and welfare of all of your workers. Evidence of due diligence is one of the two defences available to a director or person concerned with the management of a corporation charged with an offence.

WHAT IS REQUIRED?

Due diligence requires everyone in the workplace, (employers, directors, managers and supervisors, in particular) to understand and comply with the duties set out in the OH&S Act and associated legislation.

Next, you must identify risks to safety, health and welfare in your workplace, particularly those risks identified in the OH&S Act and associated legislation. Once risks are identified, due diligence requires that you address these risks through a properly functioning and documented health and safety system. The more harmful or serious are the potential dangers, the more you must guard against them to prevent workplace injuries and illnesses.

Whether an individual acted diligently depends on whether he or she took every precaution reasonable in the circumstance for that particular case. There are a number of general measures that all employers can and should implement in an attempt to comply with the Act and to demonstrate due diligence. These include;

- Carrying out all duties under the Act and ensuring that your company complies with the Act and associated legislation
- Setting up a well documented system for identifying, reporting and responding to all actual and potential hazards in the workplace
- Establishing safe practices, procedures and controls that are specific to the hazards in your workplace and that either meet or exceed the requirements set out in the Act
- Providing instruction and training on an on-going basis to all employees, including supervisors and workers
- Communicating regularly with employees about foreseeable health and safety hazards
- Allocating adequate time and resources for the health and safety program to be established and followed by all parties in the workplace, including the occupational health and safety committee
- Monitoring and auditing of your program on a regular basis.

Due diligence is a proactive management tool that, when used properly, will foster the careful and systematic identification and assessment of specific workplace hazards and the establishment of control measures to prevent costly injuries and illnesses at work.

Having clearly established that we are all involved with the OH&S requirements of Plant lets have a look at what you need to do to comply with the legislation relating to Plant. In simple terms its;

Step 1 'FIND IT' – Identify the hazard
Identify all hazards associated with the machine and its related systems of work.

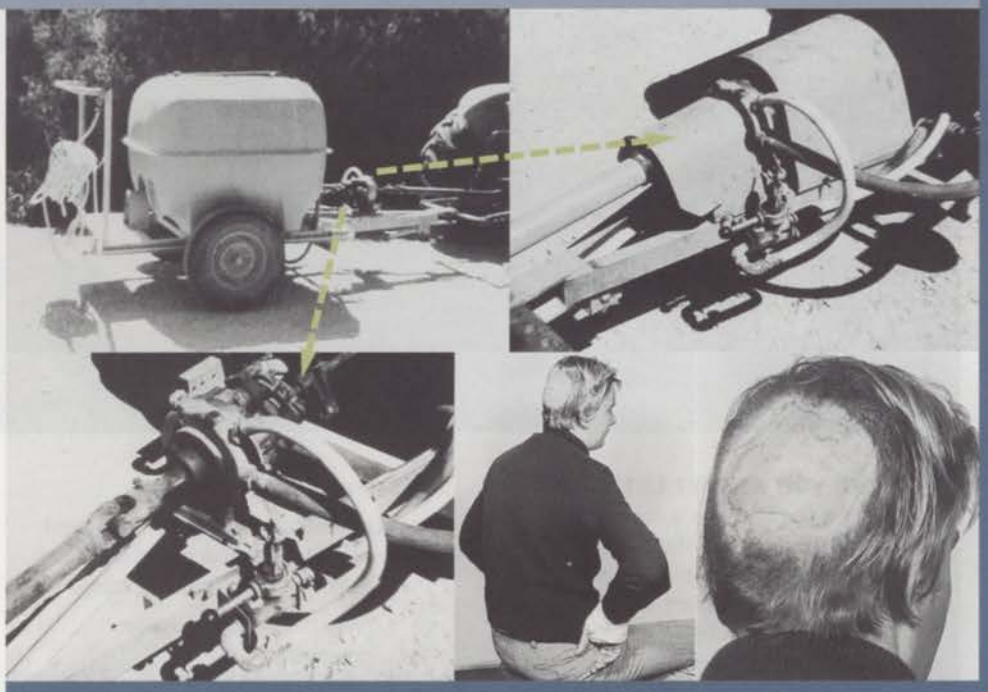
Step 2 'ASSESS IT' – Assess the risks
Assess the likelihood and severity of risks arising from the identified hazards.

Step 3 'FIX IT' – Control the risks
Decide upon and apply the appropriate control measures to eliminate or minimise the risks.

Step 4 'REVIEW IT'
Have the control measures eliminated or reduced the risks?

Have the control measures introduced any new hazards?

If you were to apply the simple steps outlined above you would be making a worthwhile contribution to a safe and healthy work environment.



In June 1979, Bruce Grant (Scotch Grange P/L) was operating a spraying unit when the exposed Power Take Off (P.T.O.) grabbed a loose sleeve and dragged him into the shaft, breaking his wrist and scalping the rear of his head. The above photos show the pump and P.T.O. before and after the accident and Bruce's injuries some 2months later.

RISK TABLE	Very likely	Likely	Unlikely	Highly
Fatality	High	High	High	Medium
Major injuries	High	High	Medium	Medium
Minor injuries	High	Medium	Medium	Low
Negligible injuries	Medium	Medium	Low	Low

ARE YOU READY? LET'S GO

Grab a cup of coffee, a copy of the Australian Turfgrass Management magazine and wander into the workshop. Select one item of plant and verbally 'walk' through the steps below as a group. It is mandatory that all people in the group participate. Use the information in Step 1 below as a checklist.

Step 1 – Identify the hazards.
A hazard is anything which may cause harm – injury or ill health – to employees and others in the workplace.

This part of the process involves identifying all the possible situations or events where plant or associated systems of work could harm people. This activity like most other OH&S activity is most successful when it involves several people. In particular people who are experienced in the operational characteristics of the Plant.

Ask yourself, could the plant cause injury due to:
• Entanglement • Crushing • Trapping • Cutting • Stabbing • Puncturing • Shearing • Abrasion • Electricity • Fire • Vapour • Dust • Noise • Explosion • Pressurised fluid • Poor ergonomic design etc.

Remember to document the Identification of hazards activity and continue to ask yourself 'what if'?

Step 2 - Assess the risks
Having identified the hazards it is important to identify which are the most important (ie. most hazardous) items that need addressing.

To assess risk, you consider two factors;

- The chance of each of the situations or events actually occurring (the likelihood)
- The extent of the harm (injury or ill health) should it actually occur (the consequence)

Determine;

(i) How likely it is that a hazardous event or situation will occur within the life of the plant from the following categories?

1. Very likely – could happen frequently
2. Likely – could happen occasionally
3. Unlikely – could happen, but only rarely
4. Highly unlikely – could happen, but probably never will.

(ii) What might be the consequence of a hazardous event or situation?

1. Fatality
2. Major injuries (normally irreversible injury or damage to health)
3. Minor injuries (normally reversible injury or damage to health requiring several days off work)
4. Negligible injuries (first aid)

Having determined the Likelihood and consequence of the identified hazard(s), use the Risk Table (above) to determine the risk, eg. if it is 'VERY LIKELY' and a potential Fatality it has a 'HIGH-RISK' category, it must be addressed immediately.

Step 3 – Control the Risks
Having identified Hazard and assessed the Risk you now need to Control the Risk. This is normally achieved via the application of a Hierarchy of Control, with Level 1 being the preferred option to Level 3 being the least preferred option.

Level 1 Eliminate the hazard

Level 2 Minimise the Risk ie. substitute with something safer, modify the plant, isolate the plant or hazardous aspect, introduce the engineering controls.

Level 3 Back up controls ie. implement administrative controls and work practices, require personal protective equipment

Step 4 - Review
Having successfully undertaken Steps 1 – 3 it is now important to go back to Step 1 and ensure that the risk control measure you have implemented has not created 'other' hazards.

Having verbally completed the tasks and realising that it was painless, a positive action and rewarding, you now need to document your discussion and findings. Congratulations you have completed your first Plant Risk Assessment.

Acknowledgements:
Don Reid (MSIA, RCA Occ Health & Safety QSA, Grad Dip., Occ. Hazard Management), OH&S Unit, Chisholm Institute.

References:
National Occupational Health and Safety Commission
Occupational Health and Safety Act 1985
Don Reid – Occupational Health and Safety Unit, Chisholm Institute
Occupational Health and Safety Guidelines – Tractor and Machinery Association of Australia

Footnote: The Occupational Health and Safety Unit of Chisholm Institute has a Memorandum of Understanding with the Victorian Golf Association for the provision of OH&S training and consultancy services for their member clubs. In addition we have jointly developed OH&S Policy and Procedures relevant to Golf courses which would also be relevant or easily adapted to suit other turf related sectors.

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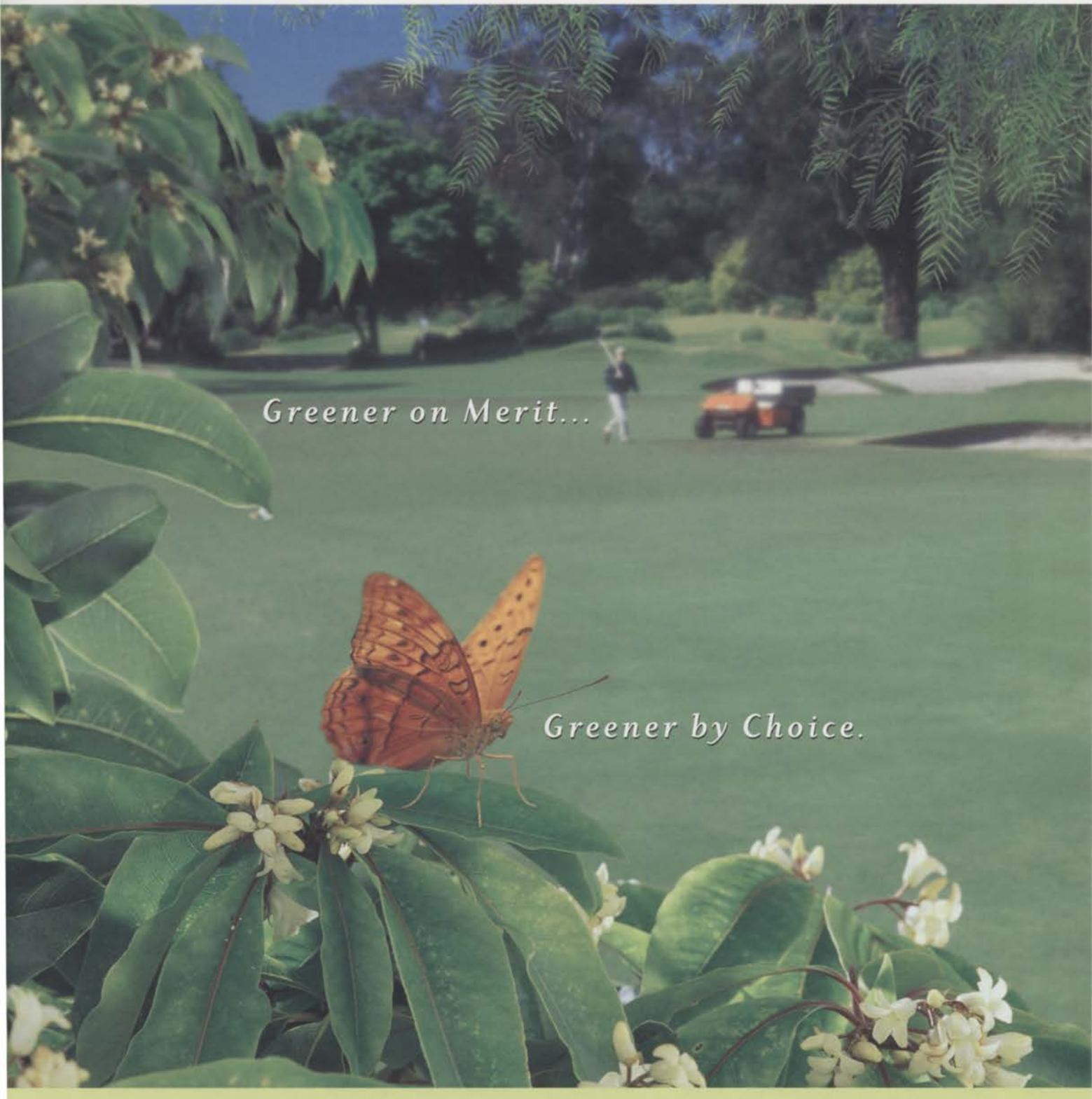

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Tree, Turf Ornamental Pesticide Guide	$66.00
Trees–Contributions to Modern Tree Physiology	$275.00
Turf Irrigation Manual	$137.50
Turf Spraying - A Practical Guide	$27.50
Turf Weeds and their Control (HB)	$185.90
Turfgrass Biotechnology	$126.50
Turfgrass Diseases and Associated Disorders	$71.50
Turfgrass Management	$192.50
Turfgrass Patch Diseases	$104.50
Turfgrass Pests	$49.50
Turfgrass Pests and Diseases	$49.50
Turfgrass Water Conservation	$47.20
Turfgrass: Agronomy Monograph 32	$132.00
Turfgrass: Science & Culture	$176.00
Wastewater Reuse for Golf Course Irrigation	$198.00
Waterplants in Australia	$49.50
Waterplants in New South Wales	$38.50
Weeds an Illustrated Guide to Weeds of Australia	$115.50
Weeds in Australia	$82.50

Please note: Prices are subject to change without notice.

Managing Wildlife Habitat on Golf Courses

By Ronal G Dodson

Environmental stewardship is high on the agenda for all associated with golf course maintenance. Superintendents are at the forefront of environmental management and continue to promote the value of golf courses to the wider community.

Many books have been written on this subject and all are valuable references. One book in particular Managing Wildlife Habitat on Golf Courses has been written with the golf course superintendents in mind.

The author, Ronald G Dodson, is the founder of Audobon International and Chairman of the Audobon Society of New York. He holds a B.S. in wildlife biology and an M.S. in Natural Resource Management and was awarded the National Environmentalist of the Year in 1985.

The book is written to be a preliminary step to continuing education in wildlife habitat management and provides as basic foundation into the principles of environmental stewardship. It can be read in its entirety or used as a reference manual as required.

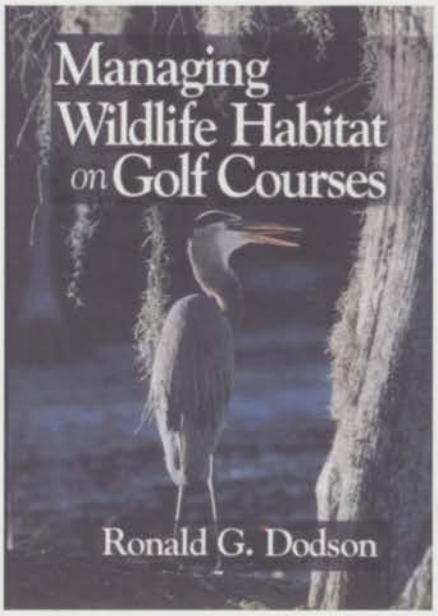
Information contained in this book, while being focussed on the USA, is refreshingly simple and easy to relate t our own experiences and issues. Chapters include: Golf Courses and Land Management, and Information on the History of Golf and the Evolution of the Conservation Movement. Wildlife Basics covers the habitat requirements of birds, mammals, reptiles and amphibians and emphasises the four basic requirements of food, water, shelter and living space. The importance of wildlife corridors for the movement of species is also given a high priority.

The book is written with a very hands on approach and is very easy and interesting to read. Colour photos may have been better for highlighting some of the examples contained in the book but they get the message across.

Many examples of what has been achieved on many courses throughout the USA help to put into perspective the fact that what we are all trying to achieve need not be made over technical, time consuming or expensive.

Managing Wildlife Habitat on Golf Courses is now an important part of our reference library and I can thoroughly recommend it to anyone associated with golf course maintenance.

Michael Russell
Golf Course Superintendent
Werribee Park Golf Club



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news

200 ATTEND TURF WICKET SEMINAR

Some 250 groundstaff and 11 exhibitors set the scene for a successful Turf Wicket and Playing Field Seminar at the Sydney Cricket Ground on 18th October.

The Seminar, with the theme "An Approach to Quality" was conducted by the NSW Cricket Association in conjunction with its major sponsor, Excell Corporation P/L and facility advisor, ISFM.

Papers were presented by Keith McIntyre, Rod Morphet and Gary Beehag, while NSW Coach, Steve Rixon gave a humorous incite into what players look for in a turf wicket.

Richard Winter, Curator of the WACA, gave the Keynote Address and outlined the steps involved in the preparation of a pitch for a Saturday game in Western Australia using Harvey clay.

One of the most important aspects of the game of cricket is the condition of the outfield. Keith McIntyre discussed several major causes of poor outfields and offered some solutions to these problems.

Closer to home for many of the ground staff in attendance was the preparation and maintenance of a suburban ground. Rod Morphett of the Hawkesbury Sports Council provided an interesting insight into the Benson's Lane Sporting Complex at Richmond, used by the Hawkesbury Cricket Club.

Richard Winter

NATIONAL AWARD HELPS AGCSA SKILLS RECOGNITION PROGRAM

The AGCSA Skills Recognition Program received a strong boost last week when Hortus Australia was awarded the prestigious 2000 National Assessment Award for exemplary assessment practices. Hortus Australia has worked closely with the turf industry over the past 2 years and this award is recognition of the high-level standards set in their assessment work.

The National Assessment Award, which aims to encourage excellence in assessment, is the result of collaboration between the University of Melbourne (Assessment Research Centre), schools, industry and assessment bodies both nationally and internationally. Judges comprised representatives from industry, ITABs (Industry Training Advisory Boards) and educational experts from across Australia.

The formal presentation ceremony in Melbourne on the 9th November was accompanied by a number of forums on assessment from international and national experts. There was strong support from experts for the holistic-style approach used by Hortus which relies on a range of different types of evidence.

AGCSA congratulates Hortus Australia on receiving this award and will continue to support its members in achieving professional acknowledgment through the AGCSA Skills Recognition Program.

Trade support for the seminar was strong. Pictured is Maurice Menhennet from Mentay who is now selling direct into NSW.

CRAIG WOOD JOINS AVENTIS CHIPCO

Aventis Environmental Science is pleased to announce the appointment of Craig Wood to the position of Sales Manager for Victoria, South Australia and Tasmania for the Chipco range of turf products. Craig has over seven years experience in turf management, having spent time at Mt Xavier Golf and Bowling Club, before pursuing commercial interests in the hospitality and food service industry, during which time he completed a Bachelor of Commerce Degree at the University of Ballarat.

Craig's primary responsibilities will be sales, technical and marketing support for the Chipco product range. Aventis is delighted to have Craig join the Chipco team that provides full support of the range in all states of Australia.

Aventis

GREEN ONE DAY – GREENER THE NEXT

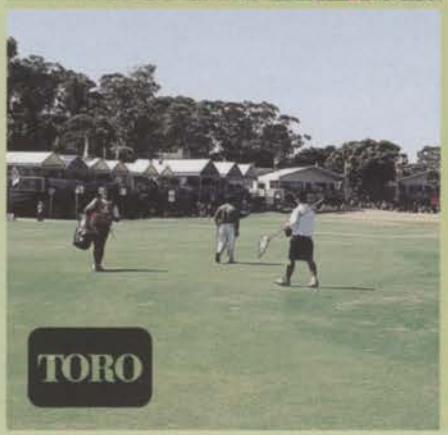
Heralded as a key element to John Deere's success in the Golf & Turf market, around 200 Turf Managers and Technicians from all over Australia and New Zealand attended the John Deere Golf & Turf Feedback 2000.

This is a biannual event and was held at the Camden Lakeside Golf Course in NSW, and The Dunes Golf Links in Victoria on the 21st and 23rd of November and provided an opportunity for attendees to test new and prototype equipment and attachments.

$1.25M worth of greens and surrounds mowers, utility vehicles, fairway mowers, tractors as well as coring and injection units were up for honest scrutiny, the results of which will be sent to the John Deere US factory to help with the design of tomorrows turf management equipment.

Big Max Walker was on hand to lighten superb lunches served at both clubs and as part of each day John Deere drew the name of one lucky person bound for the GCSAA Show in Texas. Host Superintendent at Camden Lakeside, David Skaife pocketed one of the prizes and Walter Ward from the Russley Golf Club on the South Island of New Zealand took home the other.

CQO'S KEPT BUSY AT THE HEATH



Over 40 volunteer Superintendents and Groundstaff were kept very busy on what must surely be one of the most heavily bunkered golf course in the country during the Holden Australian Open held at the Kingston Heath Golf Club in Victoria.

Proudly supported by Toro Australia and in partnership with the AGCSA, the Course Quality Official (CQO) program gives the profession of Golf Course Management visible exposure at the highest level.

Not only that, but it also provides volunteers with a rare opportunity to watch golf from 'inside the ropes' and to inspect a world class golf course in peak condition. Although many with early tee times on the last two days needed a fleet of Toro bunker rakes to keep up with the work-load, the relentless shot making of 'Badds' was something to remember.

Given a spring that was mild at best and four days of hot and dry conditions during the tournament, Martin Greenwood and his staff are to be congratulated for having the course in such excellent condition. Fairways were firm and pure, roughs were punishing and the greens were slick and true.

NU NAME FOR CHEMTURF

Signifying a shift in focus from chemicals to technology, major Australian turf industry player will change its name to Nuturf early next year.

"The name Nuturf better reflects the dynamics of our business and the broad spectrum of products and services that we offer," said Richard Waterworth, General Manager of Nuturf.

Richard Waterworth said that the old name, Chemturf, had lost relevance within the market place due to the fact that about 70% of the company's business is not chemically based. "The new name, Nuturf, fits well with our move away from chemicals and towards biotechnology," he said.

A wholly-owned subsidiary of NufarmLtd, Nuturf specialises in the marketing and distribution of a broad spectrum of pest and water-management products, specialist fertilisers, high quality seeds and hardware for turf management. It also provides analytical services including soil and tissue testing and establishment/application of contracts, protective clothing, equipment and golf course accessories.

letter to the editor

RTCA

ABN 87 201 835 394

RURAL TRAINING COUNCIL OF AUSTRALIA INC

The Editor,

In a recent article published in TurfCraft Australia magazine, entitled "The Dumbing Down of Turf Qualifications", the author condemned the Federal Government's changes to the manner in which turf qualifications can be awarded.

What was clear in the article is that the author has based his views on only limited knowledge and understanding of the new National Training Package.

The new National Training Package is more about learning and less about teaching. Put simply whereas the old system awarded qualifications on the basis of completion of coursework only, the new system is based on the demonstration of workplace competence. A fundamental difference is that the old system awarded a qualification on achieving a score of 51%. Under the new system you are either assessed as 100% competent or you don't pass. To be deemed competent, the individual must have the necessary underpinning knowledge and demonstrated ability to put the "theory into practice."

The backbone of the new system is the National Turfgrass Industry Competency Standards. The competencies describe the specific skills required at each level of workplace operation from a first year groundsman to a Golf Course Superintendent. Representatives from each of Australia's turf industry associations were involved in the development of these competencies and formally endorsed the standards. Each association is individually named in the final endorsed package.

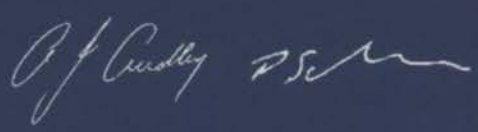
The article in question states that professionalism comes from completing teaching studies. Are we to believe that industry leaders such as John Odell, Trevor Strachan, Peter Sawyer, Peter Frewin, and Tony Ware are not professional simply because they have not attended a higher course of study? This notion is absurd. A key feature of the new system is its ability to provide recognition of the existing skills of turf managers. Many turf practitioners and managers have obtained their current skills by a range of means including attending short courses, being taught by senior colleagues, by learning on the job, by attending conferences, workshops, seminars etc. It is irrelevant as to how someone gains their skill level, what is important is that they have obtained the standards as set by industry.

The article infers that the new system fails to encourage people to strive for further learning. The reality is that the opposite is true. The assessment process under the new system assists turf practitioners in identifying specific areas in which their skills need improving to reach the industry standard. These people are now able to undertake specific studies or gain exposure to specific workplace practices to bring them up to industry standards in particular areas. This encourages these people to undertake further studies or gain further experience to obtain the set standard. This provides a great opportunity for TAFE colleges and private providers to develop specific, targeted short courses, to assist people trying to brush up on their skills in a particular area. Some TAFE colleges see this as an opportunity, others see it as a threat. To remain relevant, education providers, and particularly TAFE, must be attuned to providing the specific short courses and flexible delivery that the modern workplace now requires. Turfgrass Management is a practical business, the industry needs a practical educational system to support it.

The attainment of higher degrees is always to be encouraged in any industry and this is recognised by the awarding of formal qualifications in the University structure. This is not be confused, as the author of the article has done, with the National Training Package.

Learning involves the attainment of knowledge and skills from the broad range of experiences including study, workplace experience, networking and self directed learning. The new National Training Package encourages and recognises these learning experiences. The old system revolved around teaching, which often did little to prepare students for real life workplace situations.

The new National Training Package is a significant improvement to the educational structure that encourages learning and provides recognition for Australia's turf managers.



Tony Audley
Executive Director,
Rural Training
Council of Australia

Peter Schumacher
AGCSA
Education Convenor

A LOW MAINTENANCE CUP FROM DINT

DINT AUSTRALIA the foremost manufacturer of greenkeeping equipment in this country have just released onto the market a new putting cup. The cup has been specially masked and treated, and is not powder coated on the internal base, which lessens refurbishment requirements. With no damage being done to the paintwork from the ferrule, cups will look new for longer and require less maintenance.

This cup has already been viewed by the PGA tour of Australia and they have ordered them for their tournaments this year.

Please contact DINT directly for more information on 1800 44 3468 or email to info@dint.com.au

DINT

KUBOTA UTILITY TRACTORS

Kubota Tractor Australia's new range of utility tractors are the most significant new models introduced by Kubota for the past ten years.

Covering the 50 to 90 horsepower category, the new models deliver the latest advancements in tractor design and technology without any unnecessary extras.

They represent exceptional value for money and offer a complete package of practical features suited to most applications.

The new models have a PTO shaft that rotates 60 degrees with the engine off, making implement hook up easy and both 540 and 750 PTO speeds are standard for applications such as spraying.

For further information, or the name of your nearest dealer, please ring freecall 1800-334-653 or check out the Kubota web page on www.kubota.com.au

Plan View Looking Inside Cup

new products

NEW FROM TURFLINK AUSTRALIA IS THE AWESOME LASTEC 421D

The Lastec 421D has an 82" Articulating floating mower deck and its extremely low profile means that its operating in and under trees is a cinch.

The 421D is powered by a 38 h.p. Kubota diesel engine and its low center of gravity and zero turn capability gives the machine superb maneuverability and productivity.

For more information on this incredible machine or any other turf renovation and mowing equipment, contact Mike Pauna from Turf Link Australia on (02) 4571 1198.

TURF LINK AUSTRALIA PTY LTD

Management Reader Survey

Contact Details

Name:

Area of Employment:

Address:

Contact Ph: (w) (h)

Qu 1. Do you use AUSTRALIAN TURFGRASS MANAGEMENT magazine as a source of Turf Research Information? YES ☐ NO ☐

Qu 2. What percentage (%) of turfgrass research information do you end up utilising in making management decisions on your turf area?

Qu 3. Please rank the following subjects in order of interest level (note: 1 = most interest, 9 = least interest)

- Turf Research ☐
- Pests and Diseases ☐
- Turf Nutrition ☐
- Construction ☐
- Turf Machinery ☐
- Irrigation ☐
- Water Management ☐
- Environmental Management ☐
- General Profiles ☐

Qu 4. What would you like to see more of in AUSTRALIAN TURFGRASS MANAGEMENT magazine?

Qu 5. How do you rank the quality of the contributing writers used in AUSTRALIAN TURFGRASS MANAGEMENT?

- Excellent ☐
- Good ☐
- Average ☐
- Poor ☐
- Very Poor ☐

Qu 6. Other Turf Publications run a lot of 'Advertorials' (editorial about a companies products or services). Do you find this to be a valuable source of information and would you like to see it in AUSTRALIAN TURFGRASS MANAGEMENT?

- YES ☐
- SOMETIMES ☐
- NO ☐

We want to know what it is that YOU want to read about. Please take a couple of minutes to tell us and go into the draw to win $200 worth of AGCSA Merchandise.

Qu 7. AUSTRALIAN TURFGRASS MANAGEMENT is currently published six times per year. Please indicate what you think is the ideal number of editions per year.

- **4** ☐
- **6** ☐
- **12** ☐

Qu 8. How do you rate the COVERS on AUSTRALIAN TURFGRASS MANAGEMENT.

- **Excellent** ☐
- **Good** ☐
- **Average** ☐
- **Poor** ☐
- **Don't Care** ☐

Comments:

Qu 9. Which Turf Publication do you most prefer reading ? (please tick one only)

- **Australian Turfgrass Management** ☐
- **TurfCraft Australia** ☐
- **Golf Management News** ☐
- **Golf & Sports Turf** ☐

Please send your completed survey to:

AGCSA

Level 1, 19 Railway Parade Nth

Glen Waverley, 3150, Vic

Or Fax: 03 9886 6400

President's Pen

As I write this report the strange noise of rain on the roof is a welcome sound. The region has been soaked in the past ten days, and for anyone who has had to persevere with water restrictions since January 1998, any rain is good rain.

I would like to thank all those who have used AGCSATech since its launch in July. The response has been great and all those using AGCSATech have been more than happy with the service. If you have not used AGCSATech give it a try, the service and reports are nothing short of first class.

The workshop series has been completed and all those who attended have spoken favourably of both the content and presentation of the lectures. Thanks must go to Aventis, in particular Steve Byrne for his efforts to bring this event to all those who attended. Thanks also to John Mathiessen, Rick Brandenburg and John Neylan for preparing such detailed and well researched presentations. The next workshop series will be run in early 2001. A slight change in format will take place for these; they will be held in each state in conjunction with the respective State Associations.

The Australian Professional golf season has commenced and I would like to take this opportunity to extend to all members who have hosted or are preparing for events, best wishes from all the membership.

While I would not generally use this medium for a personal thank you, it would be remiss of me to not publicly thank Steven Hewitt who has recently left Barwon Heads Golf Club to take up a position at Thirteenth Beach Golf Links. As most members would know, quality staff are hard to find, and the successful candidate for the recently advertised Assistants position at Barwon Heads, will have big boots to fill. Good luck for the future and thanks for a job well done.

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

Peter Frewin
President, AGCSA

FNQGCSA

On Friday 17th November, the FNQGCSA had our Christmas Golf Day at Cairns Golf Club. A good array of players from the area enjoyed a very festive game of golf. Course Superintendent and host John Trezise and his staff presented a challenging course for us to tackle. A BBQ lunch and some quiet refreshments after the game made for a very pleasant day. Thanks go to our sponsors, Water Connection, Chemturf and to Roy Gripske and Sons for the trophies.

Our Annual General Meeting is planned for early January 2001, date to be confirmed by the middle of December.

I would like to take this opportunity to wish all AGCSA Presidents and members and their families a great Christmas and a happy new year.

Paul Earnshaw
President, FNQGCSA

GCSAQ

Rain has finally arrived at some lucky parts of Queensland. Once again, North Queensland has had plenty and is keen for some dry weather while in the south there has been some rain on most coastal areas. It has been patchy with the Coomera area getting 25mm in weeks. Beerwah had over 200mm in the same period. At the same time Toowomba was declared a drought area so while some places have had buckets its not over the whole state. For us, the rain came a week after renovations, so we were pretty happy.

Recent events include the Queensland Golf Industry Awards at the Sheraton Hotel in Brisbane, where the Queensland Golf Union, PGA, Womens' Golf Queensland, Secretary Manager Association and QGCSA stage a combined presentation night for the high achievers in the industry. Winners selected for recognition by our association were;

Wayne Porter, Rydges Capricorn Resort who won the Turf Apprentice of the Year.

Ben Tilley from Beerwah Golf Club who followed his AGCSA Claude Crockford award with the Queensland Golf Industry Environmental Award.

The company of the Year was won by Chemturf who sent along a table of representatives who were delighted with their win.

The Superintendents Achievement award was presented to Jeff Gambin from the Gold Coast Burleigh Golf Club. Typically, Jeff delivered a well prepared speech to the 500 people in attendance.

The highlight of the night was the chance to talk to people from all areas of the industry and seeing our high achievers recognised in front of the Golf industry. Congratulations to all award recipients.

With the Australian Open at Kingston Heath, preparations for next years Open at the Grand Golf Club are already underway. Rod Cook and Kelly Hyland will no doubt have caught up with ex Queenslander Martin Greenwood during the event to swap ideas and experiences.

Our recent field day at Club Banora was well attended and the sponsor, Turf and Irrigation gathered together an informative group of their suppliers for a 'mini expo'. Host Superintendent Bob McCowan set the course up beautifully and Club Banora looked after us very well with their fantastic facilities.

Subjects covered in our general meeting at Club Banora included presentation of the Auditors Report, current position in regard to Pat Pauli now sitting on the Queensland Golf Union research advisory committee with a member of the Secretary Managers Association. We also discussed a draft proposal to the EPA regarding noise legislation that have severely impacted some clubs in our region; collection of turf for the AGCSA turfgrass trial and summer decline research currently being funded by the Queensland Golf Union. The issue of poor member response to field days was discussed and the problems we have had with our mailing list was also covered. A decision was made to drop the $15.00 joining fee for our association.

This years Christmas Party has been cancelled, but it will be considered again for next year.

I hope everyone has a happy and health festive season.

Merry Christmas

Jon Penberthy
President, QGCSA

GCSAWA

Upon reflection this year has certainly been a busy one for our association.

I must thank all our members including of course our trade for your continued outstanding support.

It is also pleasing to note the number of membership renewals for 2001.

The Vines Resort plays host to the Heineken Classic for the last time February 1-4 2001. Once again we wish Dion Warr and his staff all the best in preparation for this event.

The world class turf research site at Shenton Park has now commenced stage three of their research project into water usage and the performance of various slow release synthetic and organic fertilisers. Dr Tim Colmer and staff at the UWA are sure to produce some interesting data from this project, which will benefit us all in the future.

The curse of many Eastern States courses "Argentine Steam Weevil" has been keeping supers in the West on their toes, with numerous courses reporting large numbers requiring urgent treatment

The final winner of the John Deere Super series event for the year 2000 was decided at Joondalup Country Club on the 7th November 2000. After a close tussle Alan Devlin GCS of Secret Harbour was the eventual winner with Jeff Lane and Wayne Miller following close behind.

Andrew Newman ("the rainman") took out the trade division prize consistently scoring well through out the year.

The winners next year will be everyone that play's in this event with JD announcing their support again for 2001.

Our events calendar for 2001 looks very exciting with some new training being included along with an interesting new inclusion, the intercourse challenge replacing the Harvey bash.

Wishing everyone a safe and happy festive season, best wishes to all from the GCSAWA.

Rob Macdonald
President, GCSAWA

NSWGCSA

With summer almost upon us, most courses in this state have enjoyed the warm start to the spring, although most areas are generally in need of more rain prior to summer.

Our new committee have settled in well and are putting the finishing touches on organising our final Education/Field day for this year at Liverpool Golf Club, with buses coming from North and South it should be well attended.

The AGCSA roving seminar held at Carnarvon Golf Club in early October represented great value and speakers both local and international worked well together. I know the day would have convinced some people to try EN's for the first time, to control the upcoming spring / summer insect pest period. With the first results of the organic products trials at Pennant Hills Golf Club just released, some early trends are showing some products to be quite effective, it is too early to have anything conclusive, however we will follow this research with much more interest.

To all those involved in this great industry of ours, a Merry Christmas and happy and healthy 2001. With the Sydney Conference starting to take shape, I look forward to seeing you all at the biggest event in this town since the Olympics.

Martyn Black
President, NSWGCSA

VGCSA

October and early November has brought substantial rain across most of Victoria which has been more than welcome in most districts, especially the Bellarine Peninsula which has been on severe water restrictions for over two years. Hopefully this Summer, the guys in the Western district will not have to man the hoses and that they get a chance to turn on their irrigation systems.

Congratulations to Martin Greenwood who under tough conditions had Kingston Heath in outstanding condition for the Australian Open. Our attention now turns to the World Match Play which is being held at Metropolitan Golf Club in early January. All the best to Richard Forsyth, and his staff who will no doubt have the courses in top shape.

The last two VGCSA meetings have been educational days with the theme being warm season grasses. A huge thank you to Phil Ford from Northern Metropolitan Institute of TAFE who was our main speaker on both days. Thank you also to John O'Dell for travelling down from Sydney to speak at the Long Island meeting. Both days were well attended which is very encouraging.

Our final meeting of the year is to be held at Kooringal Golf Club on Monday the 11th of December. The day commences at 1.00 pm with an 18-hole Ambrose golf competition. Following

golf, dinner will be served in the clubhouse where we have arranged for Mr. Trevor Grant, sports journalist with the Herald Sun newspaper to be our guest speaker. Being the last meeting before Christmas the format is less formal so come along and enjoy a game of golf while supporting your host Super Graeme Rowney.

Next years VGCSA meeting venues have all been finalised and can be found on the AGCSA Yearly Planner, inserted with this magazine.

In closing, I would like to wish all readers a safe and happy Christmas and I would particularly like to thank all the VGCSA's sponsors for their support over the past twelve months.

John Geary
President, VGCSA

SAGCSA

Its nearly the end of another year and how quickly it has gone. At the time of writing this we have been blessed with good rains in Adelaide which has been very helpful.

Most courses seemed to have fared pretty well in regard to disease over the last few months, but with our summers becoming more humid we are all on our toes for disease outbreaks.

Farewell to Vice President Shaun Storer who is leaving Adelaide to go back to Melbourne where he has taken up the position at Barwon Heads Golf Club. Good luck Shaun.

Good luck to Steve Newell and his team for the Ford SA Open. We hope that everything goes well for you all.

A quick reminder about nominations for the Claude Crockford Environmental Award. If you know of anyone who has excelled in any of these fields, please nominate them.

Out next gathering will be our Christmas Picnic in the Belair National Park at Main Oval. I look forward to a great day and to seeing you all there.

Shaun Standfield
President, SAGCSA

TGCSA

The TGCSA Seminar held at the Pines Resort proved to be a very valuable and informative day. John Neylan delivered a presentation on some environmentally sensitive preventative controls for pests and diseases. Good interaction between John and the Superintendents made for a terrific and worthwhile day. Thank you to the AGCSA for supporting our event.

I am sure that everyone is overwhelmed with the spring growth that has allowed our greens to bounce back superbly after some intensive renovations.

Thank you to everyone who attended the Trade Day on 6th December at Port Sorrell, it was a great day and I thank all those involved.

The first Field Day in 2001 will be held on the 14th February at the Launceston Country Club Casino. It will concentrate on state-of-the-art irrigation. Further details will be forwarded to all members shortly.

With Christmas just around the corner, I wish everyone a safe and Merry Christmas and a prosperous New Year.

Phil Hill
President, NSW

TGAA (Vic)

On behalf of all the TGAA members may I start by congratulating all those turf managers involved with the Olympics. They were truly great events and once again the surfaces looked fantastic and played beautifully. Who were the crazed "lawnmower men" that surely stole the show at the closing ceremony?

All members should by now have received a 2000 Buyers Guide. This is a very handy reference for all the frequent contacts.

Remember the article in the last issue of ATM on Uxbridge in England? Those interested please ring the office for details.

The new committee is coming to terms with the business structure. They have set goals and action plans for the whole year. The first reports were so enthusiastic and the wealth of expert input within the sub committees ensures value for our members and sponsors.

The Events Calendar for 2001 can be found on the ATM Yearly Planner so put them in your diaries to refresh your memories. We also would like to draw your attention to the other TGAA Regions events. Together there will be something for everyone within a short journey.

I would like to wish the new TGAAWA Good Luck. The Millennium conference really did bring the turf industry together and we extend our support and friendship across the country. Well Done. Check the website for more news- www. tgaa.asn.au

From Simone and all the Committee may I wish you all a happy and healthy festive season for you, the family and your turf.

See you next year.

Robert Savedra
President TGAA(Vic)

TGAA (ACT)

With summer approaching rapidly, the good spring rain should hold us in good stead for the upcoming hot weather.

The Annual General Meeting was held on the 22nd August with 42 members there to enjoy the night.

Thanks should be given to the Brumbies and especially Justin Harrison who was our guest speaker for the evening. The evening saw a few changes with Bruce Davies stepping down as President position and Paul Janssens taking over the helm, leaving vacant the Secretary position for long standing committee member Grant King.

A bowls day for the Col Fitzgerald trust fund was held at Canberra South Bowling Club with 90 budding bowlers attending. The day organised by the ACT bowling association was a great success with special thanks going to all those who donated prizes. Congratulations to Mal Daisley the Head Greenkeeper for the excellent conditions.

The AUSTEP seed trial is coming along well with great support given by the local clubs and businesses. A large variety of seeds are to be trailed (rye, fescues, blue grass, couch and buffalo) results should be interesting considering the weather extremes of the ACT region.

The Christmas Party is to be held on Friday 1st December at the Dickson Food Court for more information, please speak to one of your committee members.

Catch you in the clippings.

Peter Ingram
TGAA (ACT Region), Committee.

VGA

After a very dry winter, the heavens have opened up for some well overdue spring rain. Up to 180mm fell in the month of October.

The VGA opening/presentation day was held at Whittlesea Bowls Club at the start of November. It was great to catch up with friends and have a BBQ and Beer. Congratulations to Andrew Ross, Turf Manager for hosting a great day at his club.

Our schedule of events are listed on the AGCSA Yearly Planner so don't forget to put your name down for the events by contacting the VGA on 9337 0112 or 0403 045 280.

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