

The *real* differences between **natural turf** and synthetic grass



To provide shock absorbency, rubber granules are commonly used in synthetic grass, as seen here at an artificial sports field in Northbridge, NSW.

Whether you've just built your dream home and are about to develop a new garden or, you are improving an already established garden, one of your questions could be:

"Should I choose natural turf or synthetic grass?"

It's a big decision, so it's a good idea to think carefully about the answer.

Similarly, there are significant differences between playing sport, such as football, on natural turf compared to artificial surfaces. Concerns over the likelihood of injury and long term exposure to the components of artificial grass are not new, but what does current research tell us?

Natural turf has many "natural" advantages over synthetic grass, and some of these may surprise you.

Continued...

Choosing between natural turf or synthetic grass?

The facts...

What is synthetic grass made of?

Synthetic grass is made up of two main constituents that are closely related, polypropylene and polyethylene.

Polypropylene is a hard wearing plastic polymer and is found in many plastic items such as dishwasher-safe food containers. Polyethylene is synthesised from ethylene, a compound that's usually made from petroleum or natural gas. Items such as bottles and other containers used in food, medical and other consumer industries are made from polyethylene.

To provide shock absorbency, synthetic grass is usually installed with a layer of polypropylene or rubber granules (usually made from recycled car tyres) and sand as an "infill". It is often recommended that this infill be replenished and/or redistributed on a regular basis.

In comparison, natural turf is completely organic, "powered" by sunlight, nutrients and water and is naturally safe.

What are the health benefits of natural turf compared with synthetic grass?

Research has shown that natural turf has lots of health benefits. Because it is a living organism, natural turf transpires to keep cool, which is why it is great to walk on even on the hottest days. Synthetic grass doesn't transpire, rather it absorbs heat, so that on some Summer days you may not be able to walk or play on it at all.

A 2002 study by Brigham Young University in the United States, compared the air temperature of natural turf and synthetic grass at the surface of football a field and found that the maximum for the natural turf portion was 31.5°C, while synthetic grass had reached 68.5°C. An Australian study by Geoff Connellan, University of Melbourne, has shown that areas of green space can modify the local microclimate by reducing temperatures not only on the grass itself but also in the surrounding air.

Artificial turf has been used for the US' National Football League (NFL) for more than a decade. A study by the NFL Injury and Safety Panel, conducted between 2002 and 2008, recorded injuries on its nine artificial turf stadiums compared to its natural turf stadiums. The study found the rate of anterior cruciate ligament injuries was 88 per cent higher in artificial turf games compared to those held on natural grass, and the rate for ankle sprains was 32 per cent higher.

Anyone who has played hockey or football on synthetic grass knows the pain from a "burn" when you fall over and graze yourself. In addition, synthetic grass is associated with a high incidence of strain sports injuries and a phenomenon known as "turf toe" due to its lack of give.

As synthetic grass degrades with use and age, its components can break down into smaller and smaller pieces. These tiny microfibers can be easily inhaled, especially when a player falls and/or slides across the synthetic surface.

In addition, recycled rubber contains many heavy metals such as cadmium, chromium, lead, molybdenum, selenium and sulphur that have been absorbed into the rubber while in use as a vehicle tyre.

According to Dr Linda Chalker-Scott from Washington State University: "There is no question that toxic substances leach from



While natural turf keeps cool on summer days, synthetic grass can heat up to over three times the local air temperature.

| Natural Turf | Synthetic Grass |
|--|---|
| Stays cooler on hot days | Can heat up to over 3 times the local air temperature |
| Provides a natural fire barrier | Is flammable & poses a fire risk |
| Produces oxygen & helps reduce pollution | Does not produce oxygen & usually ends up as landfill |
| Self-replenishing & usually cheaper | Expensive & eventually requires replacement |
| Natural, calming & self-sanitising | Fake, artificial & can require sanitising |
| Safer sporting surface | Increased risk of sporting injury |
| Increases home values | Not shown to increase home values |

rubber as it degrades, contaminating the soil, flora & fauna and aquatic systems."

Doctor Joseph Sullivan from Massachusetts in the US carried-out a scientific review of published literature in relation to artificial turf and found that tyre rubber used for infill can have damaging effects on the human body. Dr Sullivan found that "inhalation of components of tyre rubber or actual particles of tyre rubber can be irritating to the respiratory system and can exacerbate asthma". He also observed the potential for mutagenic or cancer causing effects when people are exposed to used rubber tyre particles.

In contrast to synthetic grass, parks and gardens utilising natural turf surfaces have been proven to improve mood and mental health by providing a cool, calm and relaxing environment.

Is there a difference in the cost of installing natural turf verses synthetic grass?

Yes – a big difference. Synthetic grass can cost up to three times as much to purchase and install as natural turf. Installing synthetic grass may be as much as \$90 per m² compared with as little as \$20/m² for site preparation, buying and laying of natural turf. If irrigation is required, this could add a further \$10/m², installed.

Synthetic grass is laid down on a hard, road base surface, which means that the soil surface has to be compacted. Soil microbes and life such as worms, which help keep your soil healthy and in good physical shape, can't survive in heavily compacted soil.

In contrast, turf is installed on the surface of the soil, which is prepared, usually by levelling, not compacting. Natural turf is a living organism and after it's installed, it soon develops a relationship with the soil and its microorganisms as the roots establish themselves.

Is there a difference in maintenance costs?

Natural turf needs to be mowed, fertilised occasionally, pests and diseases may need to be controlled and, depending on your location and the weather, watered. So these are ongoing costs for natural turf.

While these costs do not exist with synthetic grass, it does require several maintenance procedures, such as:

- Disinfection (animal fluids, faeces and bird droppings tend not to break down due to the lack of microorganisms and, if left, can affect human health).
- Cleaning and sweeping of leaves and debris'.
- Checking and topping-up of infill levels (where applicable).
- Grooming to maintain texture and uniformity.
- Damage repair and replacement, including joint and seam maintenance.
- Stain removal.
- Weed removal (yes, weeds can, and do grow on and through some synthetic grass surfaces).
- Moss and algae prevention (in certain situations, applications of moss killer and/or algicide are required).

In addition, some synthetic grass manufacturers recommend regularly applying water to counteract the high temperatures reached on hot days by synthetic turf surfaces.

What is the long term cost difference?

While synthetic grass is more expensive to install, you might think its lower maintenance cost will result in lower overall costs over time. Well, in a detailed report from the Department of Sport and Recreation, Government of Western Australia, the cost of various synthetic sports fields were compared over a 25 and 50 year lifecycle. In all cases except tennis, natural turf fields were estimated to be less expensive (see Table 1).



THE NATURAL LAWN AREA OF A GARDEN PROVIDES A GREAT SPOT FOR OUTDOOR ENTERTAINING AND A COOL RESTFUL OASIS.



Continued... Rubber infill is commonly applied to synthetic grass.

Table 1: Total cost of natural turf and synthetic grass sports fields over a 25 and 50 year period

| Sports field | Natural Turf | | Synthetic Grass | |
|--------------|--------------|-------------|-----------------|-------------|
| | 25 Years | 50 Years | 25 Years | 50 Years |
| AFL/Cricket | \$1,622,167 | \$2,886,333 | \$4,090,000 | \$7,725,000 |
| Hockey | \$787,167 | \$1,387,583 | \$1,013,300 | \$1,753,575 |
| Lawn Bowls | \$619,111 | \$1,105,222 | \$784,125 | \$1,369,750 |
| Rugby | \$1,185,333 | \$2,126,167 | \$2,847,500 | \$5,397,500 |
| Soccer | \$1,004,917 | \$1,797,833 | \$2,517,500 | \$4,330,000 |
| Tennis | \$266,000 | \$552,500 | \$246,500 | \$424,000 |

(Source: Department of Sport and Recreation, Government of Western Australia, 2011)

Choosing between natural turf or synthetic grass?

The facts...

Is natural turf less durable than synthetic grass?

No. In fact, once you have installed natural turf it self-replenishes and can last a lifetime. Synthetic grass doesn't replace itself like natural turf so eventually it will show signs of wear and need to be replaced, usually when it is around eight to 10 years old (although some brands may last more than 20 years).

What are the environmental aspects of natural turf and synthetic grass?

While natural turf has been proven to significantly reduce erosion and enhance infiltration of water, nutrients and chemicals, synthetic grass inhibits infiltration and has the potential to leach heavy metals and other residues from the materials used in its construction.

Because natural turf carries out photosynthesis, it produces oxygen while removing carbon dioxide from the atmosphere and storing it as organic carbon in the soil, making it an important carbon sink. In comparison, synthetic turf does not have the ability to remove carbon dioxide from the atmosphere and significant carbon emissions come from the production and eventual disposal of synthetic turf.

You might think that natural turf needs a lot of water to become established and remain healthy. However, varieties are now available that don't need a lot of water to keep them in tiptop shape, for example, soft leaf buffalo or zoysia. Depending on your location and time of year, most natural turf lawns will initially need watering to ensure establishment. Also, if you are in a dry climatic zone, you may need to regularly water your natural lawn, particularly during summer, to keep it looking lush and green.

This isn't to say that synthetic grass is completely water free. Many synthetic grass manufacturers recommend applying water to the surface to stop soil underneath from cracking, and to cool the surface. A large amount of water is also used to make synthetic grass.

Synthetic grass is flammable while natural turf acts as a fire retardant. The South Australian Country Fire Service recommends that: "Mown lawn or grazed green grass is most appropriate immediately surrounding buildings."

If you decide to remove or replace your natural lawn, it's a matter of simply digging it up, mulching it or going over the top of it with your new surface covering. With synthetic grass, it is a very different story. Unlike natural turf, synthetic grass is not recycled or reused for other purposes, it takes an extremely long time to break down and eventually, it usually ends up as landfill.

And finally, natural turf absorbs more noise and reflects less light, reducing glare, compared to synthetic grass. Natural turf also enhances the organic biodiversity in the soil whereas the compacted base under synthetic surfaces has very little or no organic biodiversity.

To sum up, Natural Turf:

- **has a cooling effect.**
The temperature on a green lawn in midsummer can be 10°C less than bare soil, 20°C less than asphalt, concrete or pebbles and almost 40°C less than synthetic grass!
- **is environmentally friendly.**
Turf improves water quality by filtering runoff and reducing erosion. Turf also reduces greenhouse gases by absorbing carbon dioxide and producing oxygen.
- **promotes wellbeing.**
Open natural greenspace promotes physical exercise and improves mental health.
- **uses less water than you think.**
With 5 main turf types and many different varieties to choose from, drought tolerant and water efficient options are available. Turf also grows well using recycled water and water saving crystals.
- **is a natural product.**
Turf self-replenishes, provides a natural fire barrier, reduces noise and can increase home values by up to 18 per cent!

In comparison, **Synthetic Grass** is more expensive to install and maintain, requires regular disinfection to control bacteria and germs, is artificial with an unnatural feel and smell, has been proven to result in more injuries, is flammable, on hot days can heat up to three times the air temperature and is not environmentally friendly.

For more information

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Website <http://www.dailytelegraph.com.au/news/sydney-news/how-much-does-a-bit-of-grass-add-to-your-house-value-83600/story-e6freuzi-1226269187847> (accessed April 2013)

A NATIONAL SURVEY INVOLVING 114 AUSTRALIAN REAL ESTATE AGENTS IN 2012 REVEALED A NATURAL LAWN CAN ADD 18 PER CENT (OR UP TO \$75,000) TO THE SELLING PRICE OF HOMES NATIONWIDE.

The next generation of turf growers. Our turf levy investment ensures they have got a good future.



How the levy is driving the future of your Turf Industry

Developing more profitable business practices, researching new and more efficient production methods and ensuring the community is aware of the benefits of turf is vital to the ongoing viability of the Australian turf industry.

Even though natural turf has a wide range of benefits and advantages over other ground cover options, such as synthetic grass and pavers, ensuring the community understand this is a never ending process.

The long term future of the Australian Turf Industry depends on the industry's collective ability to maintain individual business profitability, research and develop production efficiencies and effectively market the benefits and inherent value of natural turf. To help enable the industry achieve this, a national turf levy was put in place in 2006.

This *Turf Facts* describes some of the benefits already realised from the turf levy, how the levy system works, how individual levy payers can have a say on levy expenditure and where to go for further information.



The Levy has funded a series of professional turf marketing photos, all of which are available to levy payers, free of charge, via the Turf Australia Website, www.turfaustralia.com.au.

Continued...



Turf Facts has been funded by HAL using the Turf Levy and matched funds from the Australian Government.

For more information please contact Turf Australia on
P: (02) 4588 5735
E: admin@turfaustralia.com.au
www.turfaustralia.com.au



How the levy is driving the future of your Turf Industry (cont.)...

Look at what the turf levy is doing and how it is working for YOU...

Marketing

Project: *Perfect Patch of Green*

Cost: \$25,000 per year

Outcome: Facilitated by Horticulture Australia Limited, the PPoG program promotes the benefits of green space in and through educational and community centres. Also, through the alliance with Landcare, it further leverages and promotes the environmental benefits of turf.

Benefit to industry:

PPoG program generated an equivalent advertising value of \$300,000 in the first year of operation across a wide range of communication mediums - social, print, radio, television and online media.



Research & Development

Project: Redlands Research projects (TU10025 & TU12022)

Cost: \$433,000 over 2.5 years

Outcome: While some people have been aware of the erosion control properties of turf, there was minimal information quantifying how effective turf mitigates erosion and no demonstration facility showing how turf compares with other, more commonly used, erosion control measures. These projects enabled the creation of a state-of-the art research and development facility that enables large scale erosion control education and demonstrations.

Benefit to industry:

Projected to result in a 2 per cent market increase nationally, or about \$10 million within five years.



Turf's levy investment driving the industry's future projects

Since 2006, when the Australian turf industry introduced a national levy to fund vital R&D and marketing projects, the outcomes have improved the professionalism within the industry, promoted the benefits of turf grass and assisted turf producers to improve their business profitability.

Everything you need to know about the levy

The Australian Government introduces levies and export charges at the request of an individual industry. Today there are 66 agricultural and horticultural industry levies that fund a large variety of R&D and marketing programs.

Within Australia's turf industry, there is a domestic turf levy and an export charge which is collected by the Department of Agriculture – Levies.

The collected levy funds are then managed by Horticulture Australia Limited (HAL) on behalf of the industry, but MOST IMPORTANTLY under the direction of the industry through a group called the Turf Industry Advisory Committee (IAC).

What is the turf levy and export charge?

All turf growers that produce and sell over 20,000m² of turf annually pay a levy of 1.5 cents/m² on the turf sold or exported. This represents a minimum annual payment of \$300.

The erosion control research project, funded by the turf levy, is one example of the 272 R&D projects funded by Horticulture Australia Limited specifically for the turf industry.

Continued...



What the growers say about their LEVY investment...

"The turf levy has not only helped provide our industry with much needed Industry Development resources, it has funded vital research, such as the erosion control facility."

Paul Saad, Southern Cross Turf, NSW

How much is collected?

The collected Turf Levy has two components:

- **R&D** - 80% of the levy collected and generates approximately \$450,000 per year. This is then matched dollar-for-dollar by the Australian Government, resulting in approximately \$900,000 per year.
- **Marketing** - 20% of the levy collected and generates approximately \$110,000 per year. This is not matched.

The Turf Levy collects only 0.2% of the total farm gate value of turf produced in Australia. This is significantly lower than other horticulture industries. Many collect 0.5% of their total farm gate value and some industries collect up to 10 times more than turf, or up to 2% of the total farm gate value for those industries.

How is the turf levy charged and then collected?

The national levy is paid by a turf producer on the turf product that they sell in Australia, at a rate of 1.5 cents/m².

The export charge, also 1.5 cents/m², is payable on turf produced in and exported from Australia. No export charge is payable if the domestic levy has already been paid on the product to be exported.

The person paying the national levy and/or export charge is liable in terms of paying the levy and/or export charge and submitting all relevant return forms to the Department of Agriculture – Levies.

How the levy is driving the future of your Turf Industry (cont.)...



The Annual NxGen forums are partially funded by HAL using the turf levy, voluntary contributions from Turf Australia and matched funds from the Australian Government. They help the professional development of the next generation of turf growers.

What is the Turf Industry Advisory Committee?

The Turf IAC is a committee appointed by the HAL Board. The IAC's key responsibility is to provide advice to the HAL Board on expenditure of the Turf Levy and the Australian Government's matching contribution for R&D activities. It does this through reference to the industry's Strategic Industry Plan (SIP) and the preparation of Annual Investment Plans which link directly to the SIP.

Membership (currently 8, including 2 ex-officio members and an independent chair) of the IAC is recommended to HAL by Turf Australia (TA) and appointment is approved by the HAL Board. The Current IAC members are Barry Underhill (chair), John Keleher, Sarah Mason, Dr Ian Chivers, Simon Adermann and Anthony Muscat.

The IAC has an independent Chairman while the TA Business & Industry Development Manager (BIDM) and the HAL Industry Services Manager (ISM) are ex-officio, or non-voting, members.

TA provides Secretariat support for the IAC. MOST IMPORTANTLY, growers can have an input into how the levy is invested through the IAC by contacting the IAC members directly or by contacting the TA office.

The IAC advises the HAL Board of how they think the levies should be invested regarding R&D and marketing projects. The HAL Board has the final say, under industry advice, on how the collected levy and matching funds are spent.

The Turf IAC and HAL have responsibility for ensuring that the SIP is prepared and successfully implemented. However, the success of the SIP will ultimately be dependent on all turf levy payers and the peak industry body, TA, taking ownership of it and being committed to its success.

R&D

Over the past two years, R&D in the Australian turf industry has been deliberately guided by the Strategic R&D Plan 2012 – 17 which was designed to lead the industry's R&D investment and activities.

However, while the industry can be proud to have such a concise and well-structured plan, at the current levy of 1.5 cents/m² this vital R&D cannot fully be put into action.

Since 2000, over 272 R&D projects have been funded by HAL using a mixture of levy, voluntary contributions and matched 'dollar for dollar' funding from the Federal government. The projects cover a wide range of topics, including

- Business management systems for turf farming
- Water use and irrigation efficiency
- Development of nutrient management systems
- Turf grass breeding and variety trials
- Using turf to minimise soil erosion
- Pest and disease management
- Industry communications and extension
- Plus, many more.

Final reports from all R&D projects are available, free of charge, from either TA website www.turfaustralia.com.au or the HAL website www.horticulture.com.au.

Marketing portion of the levy

In 2011 the Turf IAC and HAL prepared a Strategic Marketing Plan 2011-2014.

This Marketing Plan identifies four key target areas:

1. Residential
2. Commercial
3. Urban Green Space
4. The Turf Industry

Within each sector, a set of key messages is and has been communicated.

There are strong linkage between the plans that guide R&D and marketing investments.

For example, a series of high quality professional turf marketing photos have been taken and are available for all turf growers to use. These images are available via the TA website, www.turfaustralia.com.au

MOST IMPORTANTLY, the levy is not a tax, it is revenue collected from growers, matched dollar for dollar by the federal government and spent specifically on R&D initiatives as well as marketing strategies (not matched) that directly benefit the turf industry.

The levy is YOUR INDUSTRY's money, and you have access to have a say in how you think the levy would be best invested, either R&D or marketing, via the IAC.

MOST IMPORTANTLY, THE LEVY IS NOT A TAX, IT IS REVENUE COLLECTED FROM GROWERS, MATCHED DOLLAR FOR DOLLAR BY THE FEDERAL GOVERNMENT AND SPENT SPECIFICALLY ON R&D INITIATIVES AS WELL AS MARKETING STRATEGIES (NOT MATCHED) THAT DIRECTLY BENEFIT THE TURF INDUSTRY.

Outcomes from the levy

All levy funded projects aim to assist in establishing a sustainable future for individual turf production businesses and the overall Australian Turf industry.

There is no doubt, that competition from other industries such as synthetic grass and other ground covers is reaching unprecedented levels. With Australia's total production figures tallying up to 38,000,000m², R&D and marketing outcomes are helping to enable profitable turf production and real returns for growers.

What the growers say about their LEVY investment...



"Lilydale Instant Lawn recently attended the Cost of Production Calculator training day in Melbourne. This is not only a great Turf Levy initiative; it is a fantastic business tool that we can see real value in using for all management purposes. Even if we had to buy it ourselves, the fact that it is an industry tool funded by the levy just makes it even better."

Steve Cole, Lilydale Instant Lawn Pty Ltd, VIC



"A massive benefit to us (Canturf) was the Couch Trial project conducted at the Royal Canberra Golf Club some years back. The trial ran for two years and we monitored the results on a regular basis, which then provided us with reliable information to select the best variety for our area."

"I also believe that the Perfect Patch of Green marketing program is an invaluable investment as we have seen the benefit first –hand from the last two schools who received the turf donation within our region."

Andy Middleton, Canturf, ACT

Continued...

How the levy is driving the future of your Turf Industry (cont.)...



The annual Turf Australia Conference & Field Days are funded by HAL and TA. They provide an excellent opportunity to learn about the levy funded R&D and Marketing programs.

When is the levy payment due?

The levy payments are usually made quarterly or, if a business anticipates producing and selling less than 50,000 m² of turf in a year, annual returns can be arranged.

**A levy year is a financial year – that is 1 July to 30 June.*

Quarterly returns

The return together with payment must be submitted to the Department of Agriculture - Levies Office within 28 days of the end of the quarters of March, June, September and December.

For example, the return and payment for the quarter ending 30 June—that is, for the months of April, May and June—are due on or before 28 July.

Annual returns

A person may apply through the Department of Agriculture - Levies for an exemption from the requirement to lodge quarterly returns for a levy year if they have reasonable grounds to believe that the levy payable in the levy year will be less than \$750.

The return together with payment must be submitted to the Department of Agriculture - Levies Office, on or before 28 August in the next levy (financial) year.

For example, the return and payment for the 2012/13 levy (financial) year* are due on or before 28 August 2013.

For more information on whether your business qualifies to submit returns annually please contact the Department of Agriculture - Levies by emailing levies.management@daff.gov.au, visiting the website www.daff.gov.au/levies or phoning 1800 020 619.

...THE TURF LEVY IS ONE OF THE MOST EXPENSIVE TO COLLECT AND THE COST OF COLLECTING IT IS PAID FROM THE TURF LEVY REVENUE.

IT IS FOR THIS REASON THAT IT IS IMPORTANT TO MINIMISE THE COLLECTION COSTS BY ALWAYS PAYING ON TIME, TAKING CARE TO ENSURE NO ERRORS AND PREFERABLY PAYING VIA ELECTRONIC FUNDS TRANSFER.

How do you register for the LEVY?

As previously stated, any turf business producing and selling over 20,000m² of turf either domestic sales or export, must register with the Department of Agriculture - Levies Office.

What is the Department of Agriculture - Levies?

The Department of Agriculture - Levies (formerly Levies Revenue Service) administers, collects and disburses levies and charges on rural commodities and products under the authority of Commonwealth legislation.

Department of Agriculture - Levies collects the levies and distributes them to HAL. It also distributes the Australian Government's matching R&D contributions.

Unfortunately, however, the turf levy is one of the most expensive to collect and the cost of collecting it is paid from the turf levy revenue. It is for this reason that it is important to minimise the collection



Another example of a levy funded professional turf marketing photo, available for free to levy payers via the Turf Australia Website, www.turfaustralia.com.au

costs by always paying on time, taking care to ensure no errors and preferably paying via electronic funds transfer.

How do I lodge my return?

Lodge your return one of these ways.

The best way to lodge your return is online. Go to www.leviesonline.daff.gov.au/LRSONLINE.

While lodging your return online, you can set up an online reminder service to ensure that you don't miss your due dates and, therefore, incur a late payment fee. This service will be operational from 1 July 2014.

Alternatively, you can scan a copy of your completed and signed return form and email it to levies.management@daff.gov.au, or fax a copy of your completed and signed return form to free fax 1800 609 150.

Or you can mail your completed and signed return form to:

Department of Agriculture – Levies
Locked Bag 4488
KINGSTON ACT 2604

To receive Department of Agriculture – Levies information, write your business email address on your return form.

Who should keep records? Which records? How long should they keep them for?

Anyone who lodges returns to the Department of Agriculture – Levies must keep records supporting the information they supplied in their returns and anyone who pays levy/export charge to an intermediary must keep information on those payments. They must keep these records for five (5) years and must make them available to Department of Agriculture – Levies officers.

Continued...

What the growers say about their LEVY investment...



"As a smaller grower, I was largely unaware of what my levy monies were used for and annoyed by having to send money away for what I didn't understand. I believed that the only benefit was to larger growers.

"Then information started to funnel through, like house cooling, scientifically proven tests for the best grasses for different areas and actual helpful information that I could share with my customers that benefited both my business and my customer relationship. Then the Staying in the Green program arrived and I am thrilled with the cost of production information I can get out of this program. The Levies I have paid are coming back to help us now, in full."

Sarah-Jane Mason Coastal Turf, NSW

"The Turf Levy is beneficial to our industry as it helps gives us credibility. For example, in 2009 our green industries here in WA had to deter the Water Corporation from putting in place a full sprinkler ban. As a result of levy funded projects, we were able to go to them with relevant and credible information that helped get a more positive and realistic outcome. A well-managed levy enables informed decision making, helps to fund marketing campaigns and provides information dissemination via magazines, E newsletters, seminars and conferences."



Bec Sellick, The Lawn Doctor, WA

How the levy is driving the future of your Turf Industry (cont.)...

How do I pay?

The best way to pay is by lodging your return online and transferring funds by Electronic Funds Transfer (EFT). Your payment is secure using EFT and, from 1 July 2014, you will be able to set up an online reminder service so that you don't miss your due dates and, therefore, incur a late payment fee.

In addition, the cost of collecting the levy is subtracted from the overall levies collected. EFT payments and paying on time is the best way to reduce collection costs and therefore result in maximum benefits for your industry.

EFT

Transfer your payment to:

Bank: Reserve Bank of Australia

BSB: 092009

Account number: 111700

Account name: AFFA Official Administered Receipts

Reference: enter the prefix 'LRS' followed by your Levies account number and your business name—for example, LRS12345 AZ Wholesale.

Cheque/money order

Mail a cheque or money order (made payable to 'Department of Agriculture - Levies') along with your return form to:

Department of Agriculture - Levies

Locked Bag 4488

KINGSTON ACT 2604

Helpful Levy Tips

- Lodge your returns online so you can set up an automatic reminder service and avoid late payment penalties. Go to www.leviesonline.daff.gov.au/LRSONLINE (service operational by 1 July 2014).
- Pay your levy dues via EFT as this reduces the cost of collecting the levies and ensures maximum benefit to the turf industry.
- Lodging your returns online and paying by EFT, not only reduces the cost of collecting the levy, it can reduce the likelihood of having to undergo a levy audit.
- Ensure you regularly read your Industry Magazine and fortnightly E-newsletters so that you are informed of the benefits available to you from the levy funded R&R and Marketing programs.

Communicating the levy investments

On a continual basis TA highlights, through its various communication channels, what projects the levy is funding. These channels include; *Turf Australia* (Industry Magazine), *Turf Facts*, E-newsletters, *Turf Australia* Website, Seminars, NxGen Forums and Annual Conferences along with copy input into the *TurfCraft* and *Australian Turfgrass Research Journal* magazines.

THE PROFESSIONALLY PRODUCED TURF AUSTRALIA INDUSTRY MAGAZINE IS JUST ONE OF THE MANY FREELY AVAILABLE INDUSTRY COMMUNICATION TOOLS, FUNDED BY THE TURF LEVY.



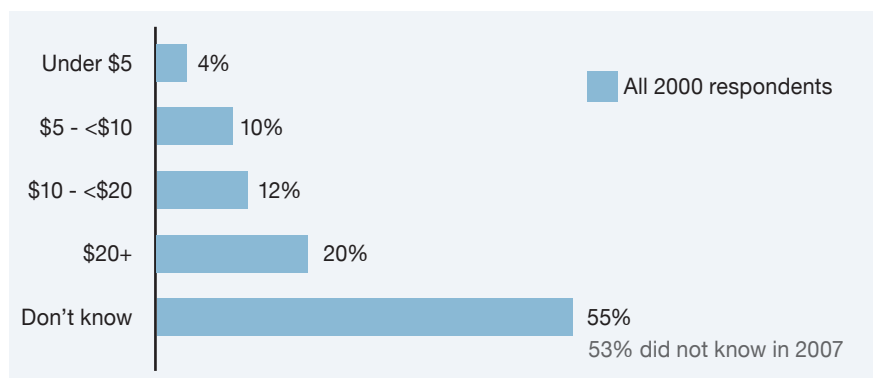


Extensive levy funded market research on 2000 consumers conducted in both 2007 and 2010 by independent strategic, branding and marketing company, 'Brand Story', found more than half (57%) believed that, irrespective of the cost, turf was the best surface for their garden or yard.

In addition, the majority believed a house with a lawn was worth 10% to 15% more than the same house without a lawn. This was reinforced by a real estate survey, compiled by L.J. Hooker that indicated a lawn could increase house sale prices by up to 18% (or \$75,000).

When consumers were asked by the marketing company: 'Do you know the real cost of turf?' In 2007, 53% did not know and in 2010 the figure increased to 59%. Interestingly, the majority of those who said they did know quoted the cost of turf as between \$10 and \$20 per square metre (supply only), while 20% of consumers thought the cost of turf should be more than \$20/m²!

Diagram 1: Consumers Perceived Cost/Value of Turf. (source Brand Story 2010)



Continued...

BACKGROUND:

Today's consumers recognise the benefits of NATURAL TURF and are willing to pay for it, despite marketing campaigns that promote alternative ground covers, such as synthetic turf or pavers.

This has been seen clearly in recent market research, where consumers:

- Want natural turf around their home and near their work place
- Recognise that lawns add between 10% and 15% to the value of a home
- Believe natural turf provides an ideal surface for, and softens the look of, a home
- Do not know the actual cost of natural turf but, on average, are willing to pay \$15 per square metre

In addition, independent contract landscaping rates show that, when compared to pavers, synthetic turf, sandstone, concrete and mass garden plantings, natural turf is the cheapest ground cover option. This includes site preparation, supply and installation costs.

So, despite all the facts pointing to consumers being willing to pay good money for natural turf, out of all Australia's capital cities, only in Darwin does turf sell for a price that matches consumer expectations of \$15/m².

Because the majority of Australia's turf producers sell directly to consumers, growers have control over the market price.

The opportunity, therefore, exists for Australia's turf industry to considerably improve its professionalism and profitability by ensuring all customers recognise and pay for the real value and benefits of natural turf.

How Consumers Value Turf

More research was conducted in 2013, by another independent marketing company, 'Sprout Research', who found that from the 1200 consumers contacted (who had purchased turf):

- The most common brand/variety purchased (22%) was **Soft Leaf Buffalo**
- And, **32% couldn't recall** which brand/variety they had purchased

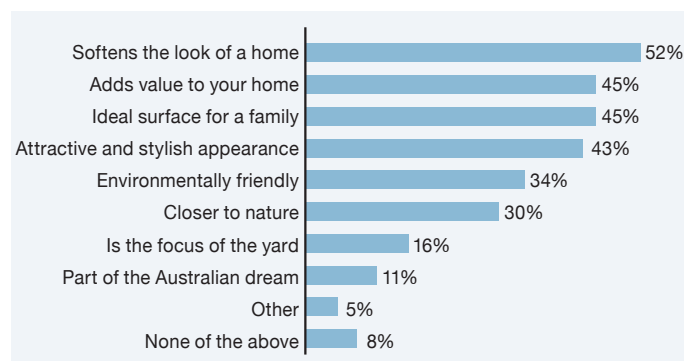
The **key reasons for buying turf**, from the 1200 consumers, were that it:

- Softens the look of the home (52%)
- Adds value to the home (45%)
- Was an ideal surface for the family (45%)

Other interesting points:

- More than half (60%) of the 1200 consumers **self-laid their turf** (either themselves or someone in their household)
- **Turf farms** were the most common place of purchase, at 32%
- Approximately 1 in 3 consumers were **concerned** about the **cost of watering** and **maintaining** their turf

Diagram 2: Consumer Reasons for Purchasing Turf.
(source Sprout Research 2013)



Finally, consumers from the Sprout Research study rated turf as the best overall ground cover when compared to garden beds, pavers, synthetic turf, pebbles/stones and concrete.

This rating information was broken-down into 13 different criteria including: bringing nature to the home; being environmentally friendly; adding value to the home; longevity and price per square metre (see Table 1).

Table 1: Consumer Ground Coverings Ratings Summary. (source Sprout Research 2013)

| TOP 2 BOX | Turf | Garden beds | Pavers | Synthetic grass | Pebbles / stones | Concrete |
|--------------------------------------|------|-------------|--------|-----------------|------------------|----------|
| Brings nature to the home | 73% | 80% | 15% | 10% | 21% | 11% |
| Appropriate for children | 70% | 25% | 30% | 61% | 11% | 18% |
| Environmentally friendly | 65% | 68% | 29% | 28% | 39% | 23% |
| Visual appeal | 64% | 66% | 41% | 31% | 45% | 13% |
| Suitable for my garden's landscaping | 61% | 57% | 36% | 23% | 32% | 26% |
| Adds value to the home | 60% | 56% | 42% | 28% | 31% | 27% |
| Quality of the surface | 52% | 34% | 41% | 35% | 23% | 33% |
| Suitable for outside entertaining | 47% | 22% | 68% | 50% | 16% | 61% |
| Longevity | 41% | 34% | 56% | 53% | 47% | 72% |
| Maintenance costs | 38% | 43% | 17% | 18% | 15% | 20% |
| Durability | 23% | 24% | 62% | 54% | 49% | 75% |
| Price per square metre | 22% | 30% | 38% | 37% | 22% | 33% |

HANDY HINTS

- Do not under value turf. Consumers believe its value is about \$15/m² for supply only
- Have a pricing strategy that takes into account the inherent benefits of turf, the continual rising costs of inputs (such as fertiliser, machinery and labour), include the services you offer (such as delivery, quality and acclimatization) and regularly review your prices (either quarterly or every six months)
- Talk with your Accountant and ask: "What do I need to know to better understand and manage my businesses profitability?" If you get a blank response, get a new Accountant
- When asked: "How much is your turf?" do not respond with a price. Instead:
 - Engage in a conversation
 - Ask for what purpose do they want the turf and what are their specific issues
 - Sell the many generic benefits of turf
 - Promote the value provided by your business (i.e. good service, quality product, acclimatized to your local area, etc)
 - Then talk about the value your turf will provide your potential customer
- Remember, you do not want every potential sale. You only want the more profitable ones!

IN SUMMARY, CONSUMERS:

- Recognise the many benefits of natural turf
- Prefer natural turf over alternate ground covers
- Are willing to pay \$15/m² or more - supply only

The TRUE VALUE & PROFITABILITY of

2 of 4

TURF SERIES

The actual price of turf across Australia

In November 2014, a regular 'Secret Shopper' phone survey was conducted on 247 turf growers and suppliers – a true representation of Australia's turf suppliers.

The survey found that the average price of Soft Leaf Buffalo in Australia was \$10.80 per square metre. However, the price varied by up to 123% across Australia, from \$7.06/m² being charged by New South Wales metro growers to \$15.75/m² in the Northern Territory. On average, 53% offered free delivery (see Table 2)

While 74% of NSW metro growers didn't charge for delivery in November 2014, this was an improvement on April 2014, when all NSW metro growers provided free delivery.

The free delivery in NSW metro is difficult to understand when you consider delivery costs in metro NSW are the highest in Australia, due to expensive toll charges and the longest delivery times.

Also, due to high real estate values, Sydney-sider's have the greatest opportunity to financially benefit from turf, but they pay significantly less than elsewhere in Australia!

Continued...

BACKGROUND:

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- Want natural turf around their home and near their work place
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In addition, independent contract landscaping rates show that, when compared to pavers, synthetic turf, sandstone, concrete and mass garden plantings, natural turf is the cheapest ground cover option. This includes site preparation, supply and installation costs.

So, despite all the facts pointing to consumers being willing to pay good money for natural turf, out of all Australia's capital cities, only in Darwin does turf sell for a price that matches consumer expectations of \$15/m².

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The actual price of turf across Australia

Table 2: Turf Price Survey November 2014 - Soft Leaf Buffalo.

| Supplier Segment (sample size) | Average price per m ² for 205 m ² | Average delivery cost (if charged) for 205 m ² | Percentage of businesses offering free delivery |
|--------------------------------|---|---|---|
| SE Queensland Growers (34) | \$9.77 | \$76.52 | 26% |
| SE Queensland Resellers (35) | \$10.58 | \$79.34 | 17% |
| Nth Queensland Growers (9) | \$9.56 | \$75.83 | 33% |
| NSW Metro Growers (42) | \$7.06 | \$82.91 | 74% |
| NSW Regional Growers (27) | \$8.30 | \$68.42 | 59% |
| NSW Resellers (27) | \$8.93 | \$84.18 | 51% |
| Victorian Growers (14) | \$10.89 | \$100.09 | 21% |
| Victorian Resellers (22) | \$12.43 | \$92.62 | 41% |
| SA Growers (8) | \$10.77 | \$31.00 | 75% |
| SA Resellers (4) | \$13.24 | n/a | 100% |
| WA Growers (12) | \$11.75 | \$80.55 | 8% |
| WA Resellers (5) | \$11.37 | \$99.00 | 80% |
| Northern Territory (2) | \$15.75 | n/a | 100% |
| TOTAL AVERAGE (241) | \$10.80 | \$79.13 | 53% |

According to a previous secret shopper survey in April 2014, all NSW metro growers were providing free delivery for Soft Leaf Buffalo. However, by November 2014 the situation had improved slightly with 26% of NSW metro growers now charging for delivery at an average of \$82.91 for 205 per m².

In 2014, the phone survey also found that **the price of Couch varied by up to 115% across Australia**, with:

- The lowest price being \$4.65/m² in North Queensland
- The highest being \$10.00/m² in the Northern Territory

Across the State and Territories, 32% of suppliers were also offering free delivery for 205/m² of Couch (see *Table 3*).

The same phone survey found that the price of Kikuyu varied by up to 135% across Australia with:

- The lowest price being \$3.77/m² (NSW metro growers)
- The highest being \$8.85/m² (South Australian resellers)
- 62% of state and territory suppliers offering free delivery
- 76% of NSW metro growers not charging for delivery (as well as selling Kikuyu at the cheapest price in Australia) (See *Table 4*)



A real estate survey compiled by L.J. Hooker indicates that lawns can increase house sale prices by up to 18% per cent, or \$75,000. This is one of the many ways consumers receive and recognise the value of natural turf.

Table 3: Turf Price Survey November 2014 - Couch.

| Supplier Segment | Average price per m ² for 205 m ² | Average delivery cost (if charged) for 205 m ² | Percentage of businesses offering free delivery |
|------------------------------|---|---|---|
| SE Queensland Growers (34) | \$5.03 | \$76.52 | 26% |
| SE Queensland Resellers (35) | \$5.65 | \$75.07 | 20% |
| Nth Queensland Growers (13) | \$4.65 | \$94.38 | 38% |
| WA Growers (10) | \$6.79 | \$80.60 | 9% |
| WA Resellers (1) | \$5.50 | \$99.00 | 0% |
| Northern Territory (2) | \$10.00 | n/a | 100% |
| TOTAL AVERAGE (95) | \$6.27 | \$85.11 | 32% |

The results for the actual price of Soft Leaf Buffalo, Couch and Kikuyu clearly highlight and show that Australia's turf growers are significantly undervaluing their product, when compared to consumer expectations.



The cost of delivering turf is significant and includes the cost of labour, trucks, forklifts, fuel, road tolls, etc.

The TRUE VALUE & PROFITABILITY of

2 of 4

TURF SERIES



Kikuyu



Couch



Soft Leaf Buffalo

Photos provided by Anco Turf.

The actual price of turf across Australia

Table 4: Turf Price Survey November 2014 - Kikuyu.

| Supplier Segment | Average price per m ² for 205 m ² | Average delivery cost (if charged) for 205 m ² | Percentage of businesses offering free delivery |
|----------------------------|---|---|---|
| NSW Metro Growers (41) | \$3.77 | \$81.70 | 76% |
| NSW Regional Growers (26) | \$4.78 | \$68.45 | 58% |
| NSW Resellers (26) | \$5.36 | \$70.55 | 54% |
| Victorian Growers (14) | \$7.71 | \$100.09 | 21% |
| Victorian Resellers (18) | \$8.47 | \$93.92 | 33% |
| SA Growers (9) | \$7.58 | \$10.00 | 89% |
| SA Resellers (2) | \$8.85 | n/a | 100% |
| TOTAL AVERAGE (136) | \$6.65 | \$70.79 | 62% |



As with delivery, installation of turf takes time and money. Are you making a profit on your turf delivery and/or installation services?

HANDY HINTS

- Do not under value turf. Consumers believe its value is about \$15/m² for supply only
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IN SUMMARY:

These results clearly highlight and show that Australian turf growers significantly undervalue their product when compared to consumer expectations.



For a different perspective, the industry has compared the cost of alternative ground covers to natural turf using figures from the Landscape Association of New South Wales and ACT. These figures come from the 15th Edition of the *Guideline Schedule of Rates for Landscape Works*, which was published in 2013, and is revised every two years.

The bottom line is that natural turf is the cheapest ground cover option, by a big margin. Even the high end of natural turf is cheaper than the low end of any alternative ground cover option.

The Ground Cover Area Calculator, found at Turf Australia's website www.turfaustralia.com.au, allows anyone to enter a proposed ground cover area and to determine the cost of six different types of ground covers.

Table 5 shows the detailed costings behind the ground cover area calculator and provides a range from low to high for each of the six ground cover options.

The Ground Cover Area Calculator includes figures for: site preparation; underlay; soil; surface preparation; supply; installation and optional finishing.



Guideline Schedule of Rates for Landscape Works, 15th Edition

Continued...

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In addition, independent contract landscaping rates show that, when compared to pavers, synthetic turf, sandstone, concrete and mass garden plantings, natural turf is the cheapest ground cover option. This includes site preparation, supply and installation costs.

So, despite all the facts pointing to consumers being willing to pay good money for natural turf, out of all Australia's capital cities, only in Darwin does turf sell for a price that matches consumer expectations of \$15/m².

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How the cost of natural turf compares with alternative ground covers

Table 5: Ground Cover Area Calculator detailed cost references.

| Surface | Site Preparation costs (m ²) | Supply & Install costs (m ²) | Optional Finishing costs (m ²) | Total costs low – high (m ²) | Median cost (m ²) |
|-----------------------------|--|--|---|--|-------------------------------|
| Natural Turf | Rip \$3.20 [p 35] Level \$2.80 [p 35] Turf Underlay 75mm \$4.50 [p 90] TOTAL \$10.50 | \$14.70 - \$17.50 [p 96] | Top dressing \$3.75 [p 96] | \$25.20 - \$31.75 | \$28.48 |
| Synthetic Grass | Rip \$3.20 [p 35] Level \$2.80 [p 35] Crushed rock base (min 200mm) \$24.00 - \$38.50 [p 42] Mesh/Geotextile \$6.00 [p27] TOTAL \$36.00 - \$50.50 | Underlay \$10.00 – \$103.75 [p 64] Synthetic grass/sporturf \$10.75 - \$125 [p 64] TOTAL \$48.75 - \$228.75 | n/a | \$56.75 - \$279.25 | \$168.00 |
| Pavers | Rip \$3.20 [p 35] Level \$2.80 [p 35] Crushed rock base (min 100mm) \$16.50 - \$38.50 [p 42] TOTAL \$23.50 - \$44.50 | Pavers \$40.00 [p 64] Laying, pattern dependent \$80.00 - \$132 [p 64] TOTAL \$120 - \$172 | n/a | \$143.50 - \$216.50 | \$180.00 |
| Sandstone | Rip \$3.20 [p 35] Level \$2.80 [p 35] TOTAL \$6.00 | \$175 - \$250 [p 64] | n/a | \$181.00 - \$256.00 | \$218.50 |
| Concrete | Rip \$3.20 [p 35] Level \$2.80 [p 35] TOTAL \$6.00 | \$54.00 - \$95.00 [p 45] | Concrete finishing \$20.00 - \$50.00 [p 46] | \$80.00 - \$151.00 | \$115.50 |
| Mass Garden Planting | Rip \$3.20 [p 35] Level \$2.80 [p 35] Garden soil \$9.00 - \$16.50 [p 89] TOTAL \$15.00 - \$22.50 | Plants \$34.80 - \$195.00 [p 100], based on a minimum of one 10l or 75l plant per m ² | Mulch \$9.50 - \$12.50 [p 92] | \$49.80 - \$230.00 | \$139.90 |

Source: Guideline Schedule of Rates for Landscape Works (15th edition), produced by Landscape Association NSW & ACT, 2013.
(Individual page reference to the Guideline Schedule of Rates for Landscape Works publication are noted)

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IN SUMMARY:

The bottom line is natural turf is the cheapest ground cover option by a big margin. Even the high end of natural turf is cheaper than the low end of any alternative!

The TRUE VALUE & PROFITABILITY of 4 of 4 TURF SERIES

Patches of poor quality turf identified during harvest adds to the overall cost of turf production.

Knowing how much it costs you to produce turf

Understanding how consumers value turf, the variable price for turf across Australia and the costs of alternative ground covers are an important part of running a profitable turf business.

The other important part is knowing your actual turf production costs, including overhead and variable costs, and understanding which varieties are more profitable.

To help growers achieve this, Turf Australia developed a **Turf Cost of Production Calculator**. The Calculator is a simple Excel-based spreadsheet which enables growers to calculate the costs to grow, deliver and/or install turf.

The **Gross Margin part of the Calculator** analysis asks for information on:

- Production estimates (area planted)
- Variable costs:
 - Fuel and oil
 - Machinery (repair and maintenance)
 - Fertiliser, chemicals
 - Soil conditioners
 - Seed or stolons
 - Irrigation costs
- Yield and price assumptions for up to 10 varieties

Continued...

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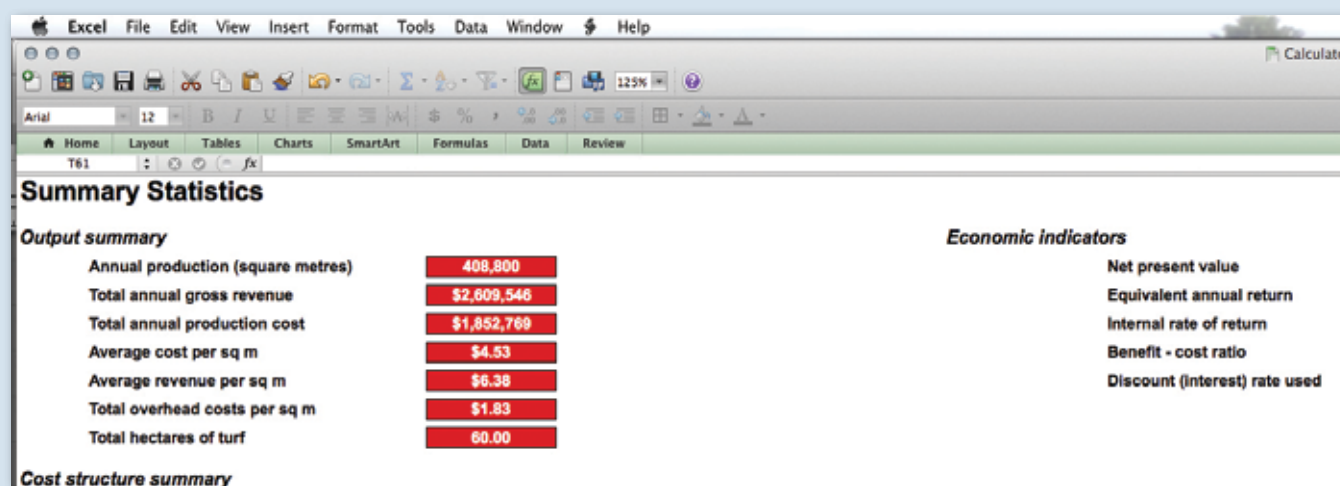
Once this information has been inputted, the **Cost of Production Calculator** then provides a **Farm Production Summary** which includes:

- Total variable costs
- Total revenue
- Farm gate gross margin
- Gross margin per square metre

The **Cost of Delivering Turf** also can be calculated, including:

- Contract delivery
- Farmer-owned delivery
- Machinery operations (truck, trailer, forklift, other)
- Labour
- Capital costs
- Other operating expenses (insurance, registrations, clothing, safety equipment, ropes and tie downs etc.)

Table 6: The Cost of Production Calculator Farm Production Summary Output example showing Soft Leaf Buffalo as the most profitable Turf Variety, followed by Zoysia and then Couch (60Ha farm example).



| Summary Statistics | |
|-----------------------------------|-------------------------------|
| Output summary | |
| Annual production (square metres) | 408,800 |
| Total annual gross revenue | \$2,609,546 |
| Total annual production cost | \$1,852,769 |
| Average cost per sq m | \$4.53 |
| Average revenue per sq m | \$6.38 |
| Total overhead costs per sq m | \$1.83 |
| Total hectares of turf | 60.00 |
| Cost structure summary | |
| Economic indicators | |
| | Net present value |
| | Equivalent annual return |
| | Internal rate of return |
| | Benefit - cost ratio |
| | Discount (interest) rate used |

The **Cost of Production Calculator** takes into account business overheads, including:

- Permanent farm labour
- Farm overhead expenses:
 - Diesel and unleaded fuel in addition to the direct operations (pumps, generators, vehicles)
 - General repairs and maintenance
 - Electricity
 - Accounting and legal
 - Admin, phone
 - Travel
 - Vehicle registration
 - Insurance, rates and taxes
 - Leases

Capital Related Overhead Costs also are included, such as:

- Depreciation associated with machinery and equipment used by the business
- The finance or opportunity costs associated with holding:
 - Plant and equipment
 - Buildings and infrastructure
 - Land

Growers who provide turf laying services can also determine their total **Turf Installation Costs**. The **Cost of Production Calculator** can calculate the cost of contract or farm based installation, including all machinery, labour, capital and variable costs, as well as site preparation where provided.



Being on top of your accounts and knowing your actual costs is an essential part of running a successful turf farming business.

The **Cost of Production Calculator** enables the turf growers to calculate their total annual gross revenue and total annual production costs as well as determining overhead and total costs per square metre and providing the average revenue per square metre. Knowing this information and how the numbers change from season to season, with market changes and from variety to variety is essential in managing a professional and profitable turf business.

The **Economic Indicators** that are calculated include:

- Net present value (total and per square metre)
- Annual return (total and per square metre)
- Internal rate of return
- Benefit cost ratio

Table 7: Cost of Production Calculator Economic Indicator Summary Output example.

| Summary Statistics | |
|-----------------------------------|-------------|
| Output summary | |
| Annual production (square metres) | 408,800 |
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| Total hectares of turf | 60.00 |

The **Cost Structure Output** provides total and per square metre summaries for:

- Growing costs
- Farm operating
- Farm labour
- Delivery
- Installation
- Farm capital



Table 8: Cost of Production Calculator Cost Structure Summary Output example.

| Cost structure summary | |
|-------------------------------|-------------|
| | Annual cost |
| Growing Costs | \$367,500 |
| Farm Operating | \$109,900 |
| Farm Labour | \$328,250 |
| Delivery | \$389,380 |
| Installation | \$348,285 |
| Farm Capital | \$309,455 |
| Replacement capital indicator | \$47,415 |

The **Turf Variety Summary Output** enables growers to compare the average price, total cost and profit between turf varieties.

In Table 9's example, Soft Leaf Buffalo is again the most profitable, followed by Zoysia then Couch Grass.

Table 9: Cost of Production Calculator Variety Summary Estimate Output example.

| Variety | Average Price | Total Cost | Profit |
|---------------------|---------------|------------|--------|
| Couch | \$3.42 | \$2.73 | \$0.69 |
| Buffalo | \$5.07 | \$2.73 | \$2.34 |
| Zoysia | \$4.80 | \$2.73 | \$2.08 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| | \$0.00 | \$0.00 | \$0.00 |
| Delivery | \$1.14 | \$0.95 | \$0.19 |
| Installation | \$1.16 | \$0.85 | \$0.31 |
| Business Benchmarks | | | |

Finally, the **Business Benchmarks Calculations Output** show:

- Profit as a % of turnover
- Machinery investment to income ratio
- Variable costs as a % of turnover
- Overhead costs as a % of turnover
- Delivery costs as a % of turnover
- Installation costs as a % of turnover
- Turnover per Full Time Equivalent (FTE)
- Profit per Full Time Equivalent (FTE)
- Return on capital

Continued...



Successful Cost of Production workshops are held around Australia. Webinars and individual assistance is also available.

Knowing how much it costs you to produce turf

Table 10: Cost of Production Calculator Business Benchmarks Output example.

| Business Benchmarks | |
|---------------------------------------|-----------|
| Profit as a percentage of turnover | 29.00% |
| Machinery Investment to Income Ratio | 0.6 |
| Variable costs as a % of turnover | 14.08% |
| Overhead costs as a % turnover | 28.65% |
| Delivery costs as a % of turnover | 14.92% |
| Installation costs as a % of turnover | 13.35% |
| Turnover per FTE | \$555,222 |
| Profit per FTE | \$161,016 |
| Return on Capital Employed | 22.82% |

A more detailed version of the **Cost of Production Calculator** also is available and allows growers to **calculate a more detailed assessment** of:

- Machinery costs and gross margins
- A resource summary for usage of:
 - Litres of fuel and oil
 - Electricity
 - Water
 - Fertiliser, insecticide, herbicide and fungicide

Turf Australia, in conjunction with Horticulture Innovation Australia Limited, provides training and support in using the Cost of Production Calculator.

Workshops continue to be held at key turf producing areas along with webinars, phone and face-to-face support opportunities

Case study farm examples are used, along with data input sheets which make it easy to collect on farm data.

A national delivery team consists of state industry development officers.

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The majority of turf growers who have used the **Cost of Production Calculator** believe that an increased knowledge of cost of production will lead to a more resilient and profitable turf industry.

SOME OF THE GROWER QUOTES INCLUDE:

- *The 'Staying in the Green' Turf Cost Calculator is a great way to track costs*
- *The 'Lite' version of the tool is very easy to use*
- *Helps confirm you are pricing turf so there is a profit margin*
- *It's great to see where our costs are and where there are opportunities for improvement*
- *Identified the varieties that give you a good return*
- *Highlighted things I didn't take into consideration before*

HANDY HINTS

- Do not under value turf. Consumers believe its value is about \$15/m² for supply only
- Have a pricing strategy that takes into account the inherent benefits of turf, the continual rising costs of inputs (such as fertiliser, machinery and labour), include the services you offer (such as delivery, quality and acclimatization) and regularly review your prices (either quarterly or every six months)
- Talk with your Accountant and ask: "What do I need to know to better understand and manage my businesses profitability?" If you get a blank response, get a new Accountant
- When asked: "How much is your turf?" do not respond with a price. Instead:
 - Engage in a conversation
 - Ask for what purpose do they want the turf and what are their specific issues
 - Sell the many generic benefits of turf
 - Promote the value provided by your business (i.e. good service, quality product, acclimatized to your local area, etc)
 - Then talk about the value your turf will provide your potential customer
- Remember, you do not want every potential sale. You only want the more profitable ones!



The environmental benefits of turf grass

It is a well-known fact that turf grass possesses many qualities that improve the environment and plays a critical role in urban environments and ecosystems.

A recent *Review of the Environmental Benefits of Turf* sources scientific evidence from Australia and overseas and provides a comprehensive list of the many environmental benefits of turf grass. These include benefits to the atmosphere, land, water as well as many others.

Atmosphere quality benefits

Oxygen generation

Turf grass like all other plants uses carbon and light to undergo photosynthesis. Energy for the growth of turf grass is generated from this process and oxygen is released into the environment as a byproduct.

As turf grass is so abundant, particularly in urban and suburban environments, it plays an important role in maintaining our air quality by generating oxygen.

Carbon sequestration and sinks

Turf grass can be used to mitigate climate change as it has the potential to capture and store carbon, known as carbon sequestration. Turf grass absorbs carbon dioxide (CO₂) as an input for photosynthesis which reduces carbon in the atmosphere and releases oxygen.

Appropriately maintained turf grass can sequester carbon at a rate that makes it a net carbon sink. In other words turf grass can

Open turf spaces not only reduce noise and glare, they also act as a fire barrier and significantly lower the ground surface temperature on hot summer days.

capture, convert and store more carbon in the soil than is produced to maintain it (i.e. mow, irrigate and fertilise).

Recent studies from the United States suggest that turf can sequester an average of 1.2 tonne of carbon per hectare, per year for as much as 30 to 40 years. Some studies suggest this figure might be substantially higher, depending on the climate and maintenance regime in place.

Dust prevention and stabilisation

Dust (particles of soil or other matter small enough to be moved and carried by the wind) can have a harmful impact on human health by aggravating asthma and eczema conditions and also contributes to environmental problems such as water pollution and sedimentation.

Turf grass captures and suppresses dust by slowing the wind velocity allowing dust to settle as well as preventing dust particles from becoming detached and airborne in the first place. Dust particles that are caught by turfgrass are moved via rainfall to become part of the living soil system.

Air pollution control/air quality improvement

Air pollution is the release into the atmosphere of chemicals, particulate matter or other materials that cause harm to humans or other animals. Air pollution can have serious human health implications and can lead to incidences of respiratory, heart and lung diseases which are estimated to contribute to two million deaths worldwide every year. Air pollution can also have serious environmental impacts

Continued...

The environmental benefits of turf grass (cont.)...

including ozone depletion, increased concentrations of greenhouse gases, ocean acidification and plant injury.

Turf grass can reduce smog pollution through the process of evapotranspiration. It can also control many types of air pollution by capturing and processing pollutants, smoke, dust and dirt particles from the atmosphere and entraps them into the soil using grass blades.

Water quality benefits



Turf grass provides an excellent covering for roadside verges. New low maintenance and drought tolerant varieties may only require mowing twice a year and watering for establishment.

Water filtration and purification

Water is an essential resource needed to maintain all life on earth. Turf grass can reduce the degradation of water quality by slowing down runoff and trapping pollutants, sediments and heavy metals, preventing them from leaching into adjacent water bodies.

Water purification occurs when water is leached through the turf grass root zone and into underground aquifers or when it is run over grassed areas as the leaves trap suspended solids and sediment material.

Turf grass is also used in industries such as food processing as a method of cleaning wastewater before it is discharged into natural water bodies (a type of phytoremediation). Some turf grass types have a very high tolerance of salts, chemicals and nutrients and are suitable to use to dispose of lower quality waters such treated sewerage and some mining wastewaters.

Water run-off reduction

If runoff is not controlled, it can contain pollutants, chemicals and pesticides which may lead to eutrophication and contamination of adjacent water bodies (lakes, rivers and/or streams) which can damage or kill aquatic plants and animals.

Areas of turf grass play a significant role in reducing water runoff and can retain vast quantities of water. Stormwater runoff from a healthy, dense area of turf grass can be at or near zero, meaning that virtually all runoff is eliminated. Generally speaking, runoff and pollution created by an area of turf grass, is far less than that from a hard surface or bare ground area.

Rainwater harvesting and entrapment – ground water recharge

Rainwater harvesting or entrapment refers to collecting rainwater and surface runoff from roofs or other catchment surfaces, where it is stored for future use.

Turf grasses are capable of preserving and trapping runoff and rainwater in the soil due to their growth habitat, dense plant canopy, biomass matrix and earthworm activity. In turn, this reduces excess runoff and results in more water for infiltration into the soil. The dense plant canopy of mowed turf can act as a 'sponge' by absorbing vast amounts of water which increases the rate of groundwater recharge. This can reduce the occurrence and ferocity of flash flooding by allowing infiltration of the water into the soil which is not possible in impermeable, hard surfaces such as concrete, paving or asphalt.

Land quality benefits

Reduction in nutrient movement and loss

Sediment and nutrient runoff can occur from water running off bare areas of earth, construction sites and exposed cultivated areas. This can lead to serious negative environmental effects such as eutrophication of water bodies, habitat loss, dissolved oxygen loss leading to fish kills and reduction in water clarity.

Healthy turf grass systems have the ability to absorb the majority of nutrients applied to it as fertiliser and can minimise the amount which is leached or runoff. Turf grasses have a strong and expansive root system which can enhance the entrapment and uptake of essential nutrients such as nitrogen (N) and phosphorous (P) and therefore minimise the potential of eutrophication in local water ways.

Erosion control

Turf grass is a very effective, cheap and durable form of erosion control due to its dense root system which readily and quickly binds to the soil (see *Breakout Box*). Turf grass has the potential to reduce on-site and off-site erosion and sediment pollution runoff by providing two main functions to alleviate erosion potential, including acting as a buffer strip to trap sediment and runoff and by providing surface protection to reduce sediment detachment in the first instance.

TURF GRASS IS A VERY EFFECTIVE, CHEAP AND DURABLE FORM OF EROSION CONTROL DUE TO ITS DENSE ROOT SYSTEM WHICH READILY AND QUICKLY BINDS TO THE SOIL.

Turf grass has been found to be more effective than many other control treatments such as silt fences and coir logs.

Turf controls erosion due to its high shoot density, root mass and high biomass matrix which provides protection from raindrop impact, soil stabilisation and resistance to lateral surface water flow.

Research has found that in all turf varieties tested the turf root system binds with the soil sufficiently within eight days to be secure and resist any tunneling under the turf slabs – even under heavy flows.

Turf grass can be used for erosion control on high gradients and for reducing water flow (and power) allowing for the trapping and controlling of sediment.

Soil improvement and restoration

Turf grass has a vital function in the restoration of environmentally damaged lands and soils. Turf grass can help restore damaged soils such as those affected by fire, erosion, mining, harvest and landfill areas.

Turf grass like other plants is constantly creating new topsoil from decomposing roots, stems and leaves. Soil improvement can occur using turf grasses through the addition of organic matter from composting (turnover) of organic materials such as roots and plant tissues through photosynthesis.

As the plant tissue dies, it is incorporated into the root system and turned over into the soil. A high proportion of fertile soils are often developed under a vegetative grass cover such as that of turf grass. Calculations within the research suggest that as the plant tissue dies, it is incorporated into the root system which is turned over at an annual rate of 42 per cent, meaning that about 6761 kilograms per hectare of root biomass is turned into the soil each year.

Fertile soils are often developed or improved under a vegetative grass cover such as turf, because water is captured and allowed to infiltrate into the soil providing a less hostile environment for soil microorganisms.

Biodegradation of synthetic organic compounds (phytoremediation)

Turf supports a large, diverse population of soil microorganisms, microflora and microfauna and earthworms. Compared to grassland, the average microbial biomass is 42 per cent less for cropland and 29 per cent less for forests.

These measurements were made on non-irrigated grasslands therefore, many irrigated turf grass areas are likely to have even larger microbial populations. These species are supported by, and cause the decomposition of, roots and shoots and play an important role in the ecological process of degradation of animal wastes, organic chemicals/materials, noxious chemicals and pesticides into neutralised or harmless substances.

The turf grass soil ecosystem with its large microorganism population offers one of the most active biological systems for degradation of trapped organic chemicals and pesticides, thereby functioning in the protection of soils and groundwater quality. Turf has the ability to assist in phytoremediation of contaminated land areas including salt affected as well as oil, chemical and heavy metal contaminated land.

Alleviating heat island effects

The urban heat island phenomenon is often measured by the temperature difference recorded between the city centre and rural surroundings or suburban areas, with surface and air temperatures being recorded as much higher in built-up city areas than in rural areas.

Excessive warmth in urban areas can be attributed to the use of dark surface materials such as asphalt and roofing, reduced vegetation and by the high solar radiation absorbance of urban surfaces or 'hardscape' elements of the urban landscape. These three factors contribute to the warming of the air in urban areas, thereby producing a heat island effect.

Turf has been described as "nature's air conditioner" and a type of vegetated surface that can help minimise the harmful human health, economic and environmental impacts associated with the heat-island effect.

Continued...

EROSION CONTROL

An independent economic analysis was undertaken and examined two scenarios.

1) A new housing development site and

2) A roadside verge that is 100 metre long and 3m wide.

In both scenarios the cost of a common alternative was compared to that of turf as well as to the combination of both measures. In the housing development of **Scenario 1**, a 2m wide turf buffer zone was compared to a silt/sediment fence both of which ran around the perimeter of the property.

In **Scenario 2**, full turf coverage of the verge was compared to a hydro mulch alternative and the cost of combining of both was also calculated.

Under **Scenario 1** 'turf only' as a treatment option was the cheapest being 8 per cent and 9 per cent cheaper than silt fencing at the low and high values respectively.

The combination of using two sediment and erosion control measures was, as expected, the most expensive treatment option. Note that the cost of turf grass was scheduled as zero as it was assumed it would be laid as part of the eventual landscaping and therefore only establishment and maintenance costs during the build were allocated to the turf options.

In **Scenario 2**, hydro mulch was the most inexpensive option in three of the four possible price combinations, being between 15 and 46 per cent cheaper than turf strips alone. However, a turf strip in the drain apex, becomes the optimal option. Turf strips in this instance are 13 per cent cheaper than hydro mulch. As seen in **Scenario 1**, using a combination of both measures was more expensive than using a single measure alone.

It should be noted, however, that this is based purely on a cost comparison and does not take into account the effectiveness of measures in controlling sediment and soil erosion. The effectiveness factor is important and with large fines for failure to install appropriate measures, it may be a false economy to use a substandard or ineffective control method in place of turf just because it is 'less expensive'.



Research shows that appropriately installed turf requires only eight days to be secure and resist tunnelling.

The environmental benefits of turf grass (cont.)...

Turf grasses reduce temperature in two ways; the first is by providing shade of heat-absorbing surfaces and the second through the process of evapotranspiration which dissipates high levels of radiant energy in urban areas and provides a cooling effect.

Vegetated surfaces (including green roofs) are cooler than non-vegetated surfaces. Shaded vegetated surfaces can also provide for even greater cooling and then reduce the reliance on artificial cooling from air conditioning.

In a pilot study conducted in Australia, researchers tested the temperature differences between green and hard landscape surfaces namely turf grass, mulch, gravel, artificial turf, paving and concrete. Turf was shown to have the lowest daily average temperatures compared to all other types with artificial turf commonly reaching a temperature of well over 60°C.

In another Australian study conducted in the mid-summer with an air temperature recording of 40°C, the surface temperature of turf grass was 45.65°C compared to dark concrete which was recorded at 78.27°C. Related to these measurements was the ability to absorb, hold and radiate heat through the early evening. Turf was able to cool quicker than all of the other materials by utilising its natural cooling mechanisms while other hard surfaces held and radiated heat well into the evening.

Other benefits

Noise and glare reduction

Turf grass can successfully reduce noise and glare in urban environments and has been shown to control sound levels as its rough surface characteristics absorb, deflect, reflect and refract various unwanted noises. Turf grass also has a far greater success rate of abating harsh sounds than surfaces such as bare ground or pavement.

One US study found that an area of 21m of turf grass near a roadside can abate vehicle noise by up to 40 per cent. Additionally, the surface of turf can reduce glare as it reflects light in different directions which lowers the harshness and stress of light in bright conditions on the human eye.

Fire prevention

Turf can act as a buffer zone of grass around buildings which helps to retard the spread of fires and acts as a vital firebreak. It also serves as a high visibility zone which can make the advent of fire more obvious.

In a climate like Australia's, annual bushfires present a real threat to people, property, communities and natural areas. Strategic areas of turf can help protect housing developments and townships by acting as a buffer between bush land and high priority buildings and zones to assist firefighters with access. Turf can also slow or halt fire as it sweeps through an area.

Table 1: Summary of the environmental benefits of turf grass.

| Atmosphere Quality | Water Quality |
|---|---|
| <ul style="list-style-type: none"> Air pollution control/air quality improvement Oxygen generation Dust prevention and stabilisation Carbon sequestration and sinks | <ul style="list-style-type: none"> Water filtration and purification (phytoremediation) Water run-off reduction Rainwater harvesting and entrapment - groundwater recharge |
| Land Quality | Other |
| <ul style="list-style-type: none"> Reduction in nutrient movement and loss Erosion control Soil improvement and restoration Biodegradation of synthetic organic compounds (phytoremediation) Alleviating heat island effects | <ul style="list-style-type: none"> Noise and glare reduction Fire prevention Biodiversity and ecosystem services |

Biodiversity and ecosystem services

Properly designed urban landscapes which incorporate turf can provide wildlife habitat and promote animal and plant diversity. Turf grass provides an essential habitat and breeding ground for certain fauna species which are critical for maintaining a balanced ecosystem and have potential value as an area of conservation for native wildlife and threatened species of birds, frogs, mammals and reptiles. Much of the literature refers to the benefits of golf courses in urban areas. One study from the US found turf grass ecosystems can be home to more than 100 taxa including insects, beetles, earthworms, nematodes and other invertebrates.



Over 12 verifiable environmental benefits of turf grass have been proven. This includes improving the quality of our atmosphere, water and land as well as providing biodiversity and an ecosystem in an urban environment.

The Australia turf industry commissioned a comprehensive review of turf's environmental credentials. The study A Review of the Environmental Benefits of Turf (TU12017) was a levy funded project commissioned through Horticulture Innovation Australia Limited (HIA) and conducted by independent research provider BioScience Australia Pty Ltd. For more information or to download a copy of the full report contact Turf Australia www.turfaustralia.com.au.

Modern boom sprayers need to be used correctly, which includes rotating chemical groups, and calibrated regularly in order to provide effective weed control.

Effective weed management is an 'essential' for high quality turf

Taking a long-term view and adopting an integrated weed management system are the most effective weed management options for growers wanting to reliably produce high quality turf, according to results of a recent industry project.

Ben Baudinette, Eurofins Agrisearch, has spent 12 months undertaking the *Controlling Weeds in Turf Production* (TU13032) project which released results that show how understanding the problem at hand was essential for growers to be successful in treating it.

"Weed management requires a long term integrated approach that commences prior to planting turf and continues through harvesting and eventual cultivation," Ben said.

"Understanding modes of herbicide action is integral to the long term success of any weed control program," Ben said, "as successful rotation of herbicide groups can reduce the risk of herbicide resistance developing."

"And by understanding the components of an integrated weed control plan, and then conducting all activities at the right time, successful long-term weed control can be achieved."

According to Ben's research, there were a number of critical success factors in integrated weed management:



Nick and Joe Muscat from Greener Lawn Supplies assess root health following a trial of various turf herbicides.

- **Timely implementation of tactics**
- **Rotating herbicide groups**
- **Closely following herbicide label recommendations**

"Often the timeliness of a weed control operation has the largest single impact on its effectiveness," Ben said.

Continued...

Effective weed management is an 'essential' for high quality turf (cont.)...



Herbicides were far more effective on rapidly growing small weeds, he said, and simple things like: ensuring the rate was correct for the growth stage of target weeds; whether a wetter or oil was required on application; following application recommendations (water volume droplet spectrum, pressure) and spraying in appropriate weather conditions might sound basic, but they are essential for successful herbicide use.

ROTATING TURF VARIETIES BETWEEN PADDOCKS, WHERE POSSIBLE, AND UNDERSTANDING WEEDS AND HERBICIDES WHICH IMPACT DIFFERENT VARIETIES, WILL HELP TO REDUCE SEED BANKS AND INCREASE EFFECTIVE WEED CONTROL.

Above and below: Boom sprayers are the most common form of herbicide application equipment, but they vary considerable in their condition, types of nozzles fitted, ideal tractor speed and pump pressure.

Successful integrated weed management has three key principals:

- Understanding your turf variety
- Identifying your weeds
- Timing of control strategies

Rotating turf varieties between paddocks, where possible, and understanding weeds and herbicides which impact different varieties, will help to reduce seed banks and increase effective weed control, Ben said.

Getting the most from an integrated weed management system required growers to understand the weeds which are, or will be, a problem in their turf.

"To most growers this will come from experience in individual blocks and from observation of the major weeds present in your district – in Australia, it will either be broadleaf weeds or grass weeds (or both) causing problems for turf producers." (See Table 1 below)

Table 1: Common turf weeds

| <i>Common name</i> | <i>Botanical name</i> |
|----------------------------|-----------------------|
| Barnyard grass | Echinochloa crus-gali |
| Bindy-eye | Solva sessilis |
| Capeweed | Arctotheca calendula |
| Flatweed (Catsear) | Hypochaeris radicata |
| Chickweed | Stellaria media |
| Crab grass or Summer grass | Digitaria sanguinalis |
| Creeping oxalis | Oxalis corniculata |
| Crowsfoot grass | Eleusine indica |
| Kentucky Blue grass | Poa patensis |
| Parramatta grass | Sporobolus africana |
| Paspalum | Paspalum dilitatum |
| Plantains | Plantago lanceolata |
| Rat's Tail Fescue | Vulpia myuros |
| White clover | Trofolium repens |
| Winter grass | Poa annua |





All farm chemicals need to be stored safely, which includes having bunded storage shed floors and/or containers that can capture any container leakage.



Ben Baudinette, from Eurofins Agrisearch explains the results from the levy-funded Chemical Screening Trial project to field day participants at Greener Lawn Supplies in New South Wales.

Timing the control strategies also ensures a greater rate of success with weed control and Ben said there were three stages in which weed control would be most effective.

“These are post cultivation and pre-planting, early in production, and late in production and there are several options per stage depending on your strategy and the density and diversity of the weed population.”

In any weed management program herbicide resistance needed to be taken into account.

Herbicide resistance evolves following the intensive use of herbicides for weed control and can occur in as little as three to four years if no attention is paid to resistance management.

IF YOU CONTINUE TO USE THE HERBICIDES WITH THE SAME MODE OF ACTION AND DO NOT FOLLOW A RESISTANCE MANAGEMENT STRATEGY YOU ARE CREATING FUTURE PROBLEMS FOR YOURSELF.

“Remember that the resistance risk is the same for products having the same mode of action,” Ben said, “If you continue to use the herbicides with the same mode of action and do not follow a resistance management strategy you are creating future problems for yourself.”

Growers needed to be aware of Mode of Action labelling on products – indicated by a letter code on the product label – which identifies the resistance risk of each group of herbicides.

Products represented in Group A and Group B are high resistance risk herbicides (See Table 2 overleaf).

Moderate resistance risk herbicides are: Group C, Group D, Group F, Group I, Group J, Group L, Group M, Group Q and Group Z.

Other important factors to be considered in an integrated weed management program included a number of operational aspects when spraying herbicides, these include:

Calibration: Equipment calibration in relation to the calculation of the rate of chemical specified by the label, output of the sprayer, travel speed and swath width can increase the efficacy and potentially reduce the cost of herbicide application.

Nozzle Size: The type of nozzle plays a large role in spray coverage and in particular droplet size. Different chemicals will be

more effective when the recommended droplet size is applied. This is also very important in controlling spray drift.

Irrigation: Pre-emergent herbicides will often require irrigation after application and within a set time frame. Irrigation will help prevent weed growth and development of newly germinated weeds. In post emergent, it is often beneficial to have no irrigation following treatment. Depending on the chemical, temperature and weather conditions will also play a role in efficacy.

Mowing: Mowing can void the use of herbicide treatment if undertaken too soon prior or following application. Always check the label for time restraints on mowing.

Fertiliser: Timing of fertiliser application is important and should be considered with herbicide application. If spreading manure, always know your source and have an understanding of the quality received.

Continued...



Farm chemical storage sheds need to be appropriately signposted and lockable.

Table 2 - Herbicide Mode of Action Chemical Groups

| <i>Active Constituent</i> | <i>Group</i> | <i>Weeds Controlled</i> |
|--|--------------|---|
| GROUP B CHEMICALS – ALS inhibitors, taken up by roots and leaves and are selective | | |
| Foramsulfuron | B | Winter Grass, Rye Grass, Crowsfoot Grass, Goose Grass, Paspalum, Kikuyu |
| Halosulfuron Methyl | B | Mullimbimby Couch, Nut Grass |
| Iodosulfuron-Methyl-Sodium | B | Bindii, Black Thistle, Cat's Ear, Cotula, Cudweed, Onion Grass, Medic, Mouse Eared Chickweed, Oxalis, White Clover |
| Rimsulfuron | B | Winter Grass, Rye Grass |
| Trifloxysulfuron Sodium | B | Burr Medic, Mullimbimby Couch, Nutgrass, Bindii, Ryegrass, Winter Grass, Cat's Ear, Chickweed, Clover, Cotula, Creeping Oxalis, Curled Dock, Milk Thistle |
| Prosulfuron+Dicamba | B, I | Blackberry Nightshade, Cat's Ear, Chickweed, Creeping Oxalis, Curled Dock, Khaki Weed, Milk Thistle, Bindii, Burr Medic, Cotula, Dandelion, Fleabane, Lamb's Tongue, Subterranean Clover, Wireweed, Pennywort, White Clover |
| GROUP C CHEMICALS – Inhibitors of photosynthesis and photosystem II | | |
| Bromoxynil+MCPA | C, I | Bindii, Jo-Jo, Cudweed, Dandelion, Cat's Ear, Plantains, Thistles, Oxalis, Capeweed, Creeping Buttercup, Fleabane, Clover |
| GROUP D CHEMICALS – Inhibit cell division at the roots, particularly grass weeds. Incorporate by irrigation | | |
| Dithiopyr | D | Crab Grass, Summer Grass, Winter Grass, Barnyard Grass, Chickweed, Crowsfoot Grass |
| Oryzalin | D | Winter Grass, Rye Grass, Crab Grass, Chickweed, |
| Pendimethalin | D | Crowsfoot Grass, Summer Grass, Winter Grass |
| Prodiamine | D | Barnyard Grass, Crab Grass, Parramatta Grass, Rat's Tail Fescue, Summer Grass, Crowsfoot Grass, African Lovegrass, Bahia Grass, Kentucky Bluegrass, Paspalum. Winter Grass |
| Propyzamide | D | Wintergrass |
| GROUP F CHEMICALS – Selective herbicides taken up by roots and leaves | | |
| Diffenican+MCPA+Clopyralid | F, I | White clover, Plantain, Capeweed, Cat's Ear, Bindii, Cudweed, Creeping Oxalis |
| GROUP G CHEMICALS – Pre and Post emergent contact herbicide | | |
| Oxadiazon | G | Crow's Foot Grass, Summer Grass, Winter Grass, Creeping Oxalis, |
| GROUP I CHEMICALS – Selective herbicide, taken up by the leaves and translocated | | |
| Dicamba | I | Cat's Ear, Cudweed, Pennywort, Lamb's Tongue, Fleabanes, Wireweed, Chickweed, Cotula, Sorrel, Dock, Clovers, Capeweed, Toadrush, Peppergrass, Dandelion, Medics, Scarlet Pimpernel, Creeping Oxalis, Pearlwort, Trefoil, Yarrow, Bindii, Jo-Jo, Fat Hen, Red Flowered Mallow, Purple Top, Staggered Weed, Swine Cress |
| MCPA | I | Selected control of many Broadleaf weeds |
| Quinclorac | I | Summer Grass, White Clover |
| GROUP K CHEMICALS – Selective herbicides absorbed by shoots and roots | | |
| Endothal | K | Wintergrass |
| Ethofumesate | K | Wintergrass |
| Disodium Methylarsonate+MCPA | K, I | Barnyard Grass, Bindii, Capeweed, Cat's Ear, Chickweed, Clover, Cotula, Cudweed, Dandelion, Duckweed, Fleabane, Lamb's Tongue, Mouse-eared Chickweed, Mullimbimby Couch, Nutgrass, Paspalum, Scarlett Pimpernel, Summer Grass, Water Couchgrass, White Clover |
| GROUP O CHEMICALS – ALS inhibitor mode of action | | |
| Isoxaben + Florasulam | O, B | White clover, Bindii |
| GROUP Z CHEMICALS – Diverse sites of action, uptake through plant foliage | | |
| Monosodium Methylarsonate | Z | Crab Grass, Summer Grass, Paspalum |



Safety culture pays off

Research is continuing to show that safety-minded businesses tend to be more profitable and an onfarm safety culture provides many benefits, aside from reduced fatalities and injuries. So what can you as a grower do to ensure your safety culture pays off?

Improved onfarm safety not only reduces the number of tragic deaths and injuries, but with it leads to better productivity and improved returns for farm businesses.

Backing-up this statement are several studies that have shown a farm's safety culture can improve the quality of communication between management and employees. It can also help by reducing time devoted to continually carrying out unnecessary safety-related paperwork.

"Developing a culture where safe work practices are deeply embedded is critical to the future of primary industries, particularly in relation to attracting and retaining workers," that's according to Gordon Gregory, chairman of the Primary Industries Health and Safety Partnership Advisory Committee.

Each year in Australia, the farming and transport industries record the most deaths and injuries across all workplace incidents and, unfortunately for the turf industry, turf production faces a great deal of daily exposure to both of these practices.

While there is debate on the level of paperwork required to work alongside a culture of safety in any business, any records-based system must



Ensure all protective guarding on machinery is in place and functional, warning or safety signs are in place.

ultimately satisfy the requirements of a state's current safety legislation.

Chris Howell, Work, Health and Safety Advisor to individual businesses, Lawn Solutions Australia and members of the Independent Lawn Mowing Contractors of Australia, provides practical advice to many turf farm businesses about the need for continued 'excellence' in record keeping, worker consultation, safety culture and risk management.

Continued...

Safety culture pays off (cont.)...

“Paperwork is evidence of your efforts in safety management and will give you some legal protection if things go wrong, when someone is hurt or killed,” Chris explained.

“But, the best chance you’ve got to stop adverse incidents or injuries happening is the effective management of risk.

“Paperwork and effective risk management are not the same thing, but there is an overlap between these different approaches.

“Paperwork is your written record of a safety management system, whereas risk management and the perception of risk is a reflection of your business’s ‘safety culture’.”

WITHOUT SIGNED AND DATED PAPERWORK, WHAT WILL BE YOUR DEFENCE IF THERE IS A SERIOUS INJURY OR DEATH ON YOUR FARM?

Chris Howell, Work, Health and Safety Advisor.

Developing a safety culture reduces risk while implementing a documented safety system can help improve a culture of safety and provide evidence of a safe work environment.

“After a serious injury or death, it is almost impossible to defend yourself in court without some sort of documented safety system,” Chris explained.

“And whether or not you think time spent on paperwork can reduce injuries; the fact is, that signed and dated paperwork is really important evidence of your ongoing efforts to manage risk and continuously improve the safety of your workers and their workplaces.”

Signed and dated paperwork is about the only effective evidence – just ask a lawyer. It’s not only vital after an incident, signed and dated paperwork is very useful for staff training as well as monitoring and improving your farm operations.

Trying to develop a safety culture within your operation without accompanying paperwork leads to having no real system in place that will ultimately breakdown over time.

There is no ‘one-size-fits-all’ or ‘off-the-shelf’ Turf Farm Safety Manual or Handbook that will satisfy all current safety legislation requirements. Since the introduction of the latest Work Health and Safety Act in each state, both employers and employees have ongoing responsibilities in maintaining a safe workplace.

There is no need to spend tens-of-thousands of dollars on consultants to write a safety manual that sits on the shelf. A well-documented safety management system needs to be developed as an ongoing management tool with everyone involved providing evidence of attempts to continuously improve workplace safety over time.

So when an inspector calls in for a random safety inspection and they flick through your safety documents, they are actually looking for lots of changes, crossing-outs, re-writes, corrections, initials, signatures and dates, filled-out forms, etc. It is these actions, and not the manual itself, that shows how the business is continually trying to manage workplace safety in a systematic and thorough way.

When the inspector then walks around your workplace, he or she is looking for signage and/or dangers, like trip hazards, industrially rated and labelled ladders, tagged and properly serviced electrical equipment, unguarded machinery, missing PTO covers, seatbelts that look like they are never used, or worse, not fitted at all. It’s these ‘little things’ that show how well safety is managed in your business.

And then, if the inspector meets and talks with your nervous staff to assess your ‘safety culture’, you’ll soon find out the importance of properly developing all of these things in your operation.

The only thing worse would be the same scenario after a serious injury or death. What your paperwork says and what it covers is literally your only critical evidence in your defence before and when the matter gets to court.

Without signed and dated paperwork, what will be your defence if there is a serious injury or death on your farm? If you have little evidence that you are serious about workplace safety, there can be very serious consequences for you, other staff and your business.

Above right and below: Turf farm machinery presents the risk of injury and even death. Ensuring a culture of safety includes regular maintenance and continual reminders of the many potential dangers.





Paperwork for a Turf Farm Safety Management System

Chris Howell has written more than 400 different Work Health Safety and Environmental Management Systems over the past several years. While there are similarities between all of them, each system needs to be customised as no two turf farms are the same.

Usually a **Turf Farm Safety Management System** contains the following:

1. **A Certificate of Compliance** carrying no legal weight can be helpful to get your truck past 'gate-keepers' who want to know that you "are compliant" but don't really know why they are asking. A certificate of compliance is often required if you deliver turf to, or want to work on, certain government and/or privately owned parks, depots or buildings, etc.
2. **Safety Briefing Whitepapers** covering what to do when an inspector calls, documentation of your safety management systems, insurances and how to avoid jail and/or losing your house or business in the event of a major work place safety incident.
3. **Emergency Management Plan (EMP)** to help staff know what to do in a real emergency, rather than just panic. An EMP needs to be discussed regularly with staff as they are unlikely to look for or refer to it when dealing with a real emergency.
4. **Safety Manual, Volume 1** usually contains key policies, legal information and some important blank forms covering: Company policies & procedures; Worker conduct agreements; Employee and contractor induction forms; Job safety analysis forms.
5. **Safety Manual, Volume 2** is a compendium of Safe Operating Procedures, Safe Work Method Statements, Job Safety /Risk Assessments, Safe Work Instructions and/or Safety Guides. All equipment and/or activities that could potentially cause injury or death on the farm must have well thought-out safety documentation available to be used for training, induction and agreed process and procedures. This should include regular safety talks with your staff, supported by signed and dated documentation, that provide training and evidence of staff consultation in creating and maintaining a culture of safety.
6. **Safety Manual, Volume 3** are your 'completed' safety management forms.

Top 11 Turf Harvesting Safety Tips:

- | | |
|----|--|
| 1 | Ensure all workers receive instructions and training on the work they do and they sign a register showing they believe they have received appropriate induction and training. |
| 2 | Ensure each machinery item is maintained and only operated by a competent person. |
| 3 | Consult with workers and prepare a program with suitable rest breaks that takes into account factors such as weather conditions. Suitable rest breaks and hydration are important in managing fatigue and heat stress. |
| 4 | Ensure workers have safety boots, a broad brimmed hat, sun screen, safety glasses/goggles and gloves and Hi-Vis gear for those working around vehicles and machinery. |
| 5 | Ensure an effective communication system between plant operators, transport contractors and ground staff. |
| 6 | Ensure adequate lighting and visibility for anyone working at night. Be seen, be safe. |
| 7 | Conduct induction training for staff and contractors. |
| 8 | Be wary when moving plant and machinery and eliminate manual handling and crushing hazards. |
| 9 | Ensure all protective guarding on machinery is in place and functional, warning or safety signs are in place or any other signalling devices – beepers or flashing lights are operational. |
| 10 | Reduce the hazard of slips, trips and falls by maintaining good housekeeping practices. |
| 11 | Use three points of contact when exiting large vehicles, plants and stairs. |

Continued...

20 simple, inexpensive things you can do to make your farm safer:

- 1 Constantly look for potential hazards as you go about your farm each day and discuss with staff how to reduce these risks.
- 2 Consider sources of energy, such as overhead power-lines, fuel and chemical storage, as well as things that move slowly, like irrigators, and fast, like PTOs.
- 3 Beware of potential falls from height, including into trenches, holes or from buildings or ladders as well as the potential for heavy things to fall onto people.
- 4 Think cautiously about bodies of water and water under pressure as well as confined spaces such as wells, silos and excavations.
- 5 Write a simple safety plan with your team, including ways to quickly identify hazards and minimise risks.
- 6 Talk often about farm safety with your workers, sub-contractors and family members. Let them know your concerns and encourage them to tell you theirs.
- 7 Everyone working on your farm should be properly trained about farm risks and know, at least, basic first aid.
- 8 Keep all plant and equipment in good repair and fit for the potentially dangerous jobs they do.
- 9 Where practicable and affordable fit rollover protection and seatbelts to tractors and forklifts and make sure they are used properly.
- 10 Replace any dangerous chemicals with less toxic options.

INVEST A FEW THOUSAND DOLLARS EACH YEAR IN DIRECTORS & OFFICERS INDEMNITY INSURANCE. THIS ONE SIMPLE ACT MAY SAVE YOUR FARM, YOUR BUSINESS, YOUR LIFE SAVINGS, YOUR HOUSE AND YOUR MARRIAGE SHOULD A WORKPLACE DEATH HAPPEN ON YOUR FARM AND YOU NEED TO PAY FOR LEGAL HELP!

- 11 Carefully and responsibly get rid of any toxic or old chemicals you have in storage.
- 12 Log all injuries in a simple note book, even minor ones needing just a Band-Aid, including name, date and brief description of how it happened, and always encourage workers to report near-misses.
- 13 Make sure all dangerous equipment and moving parts, like PTOs, are properly guarded and shielded.
- 14 Ensure you have suitable protective equipment available to all workers and that they are used (for example, sturdy safety boots, hats, suitable clothing, gloves, goggles and face masks).
- 15 Make sure everyone understands, signs, dates, uses your written safety procedures and follows your policies.
- 16 If using quad bikes, make sure it is with great care. They are not all-terrain vehicles and have caused many deaths and serious injuries on farms. Consider safer alternatives ASAP.
- 17 Create a safe, contained play area for young children close to the house and away from hazards.
- 18 Always store dangerous items, such as firearms & toxic chemicals, behind locked doors and remove keys to a safe place. Make sure your chemical store has effective bunding and spill management.
- 19 Invest a few thousand dollars each year in Directors & Officers Indemnity Insurance. This one simple act may save your farm, your business, your life savings, your house and your marriage should a workplace death happen on your farm and you need to pay for legal help! Ask your insurance broker today.
- 20 And if you don't have time, or the skills to do any of this complicated stuff yourself, get someone to help. While it may be time consuming, it's not rocket science.

For more information:

Safe Work Australia is an independent statutory agency responsible to improve occupational health and safety and workers' compensation arrangements across Australia. The home page is www.safeworkaustralia.gov.au/

For an example of an Occupational, Health & Safety Handbook, go to <http://goo.gl/JG8SCE> and for a barrister's opinion on how to avoid prosecution and penalty under the Work Health and Safety Act, go to <http://goo.gl/CBpMd4>

For more details on how farms are the most dangerous workplaces, go to <https://goo.gl/czhDhG> and for the latest workplace deaths and injuries statistics, go to <http://goo.gl/5dtJX0>

Most of the information in this *Turf Facts* was provided by **Chris Howell, Work, Health and Safety Advisor** to individual businesses, Lawn Solutions Australia and members of the Independent Lawn Mowing Contractors of Australia. Chris can be contacted via email safetycheck@whs-law.com.au or website www.whs-law.com.au/contact.html



Sometimes lawns, or natural turf, is criticised for using too much water. However, how much water does a healthy lawn, or a sporting field, actually need? What can we do to minimise water use on lawns and sporting fields? What are the benefits from having lawns and natural grass sporting fields and do they outweigh the disadvantages?

Australian and international research has found that:

- **The majority of home owners do not know how much water a healthy lawn needs.**
- **Overwatering of lawns and sporting fields is common.**
- **Many new turf varieties use significantly less water.**
- **There are a number of water saving practices and technologies now available.**

How much water does my lawn need?

It may surprise you to learn that many turf species, in particular warm season turf varieties, have been proven to be water wise.



Continued...

Your lawn needs less water than you think (cont.)

How much water does my lawn need? (cont.)

In Australia, warm season turf species represent 90 per cent of the turf produced and available. The main Australian warm season turf species include; Soft Leaf Buffalo, Couch, Kikuyu and Zoysia. There are many different varieties of each of these species available. Cool season turf species, such as Fescue, Blue Grass, Bent Grass and Rye Grass, use on average 20 per cent, or more, water than warm season turf species.

A study by Western Sydney University confirmed that warm season turf needs about the same amount of water as native plants, and considerably less than exotic garden plants. In addition, a study carried out in Texas, in the United States (US), showed that warm season turf can survive without any water for up to 60 days during Summer and return to health within two months after receiving water.

In another US study, once established Soft Leaf Buffalo was shown to use the same amount, or less, water as native landscape gardens. It took three years for the Soft Leaf Buffalo to become fully established and use the same amount of water as the native landscape gardens. In the fourth year, however, the native landscape gardens used more than double the amount of water compared to the Soft Leaf Buffalo - no doubt contributed to by the, now, larger size of the shrubs within the native gardens.

Are lawns overwatered?

Australian and US studies show that the majority of home owners do not know how much water is required by their lawn per week. For example, a survey of 3600 home owners in the US State of Kansas found that 62 per cent said they did not know how much water was required by their lawn per week. Of those who said they did know, 20 per cent said more than 2 inches (50mm) per week was, on average, required.

"However, the US research found only 1 inch (25mm) per week was required and, therefore, the percentage of home owners who don't know how much water their lawn needs was more like 72 per cent."

When home owners were asked: "How do you decide when to water?"

- 40 per cent said, when the lawn looked dry.
- 25 per cent used a regular schedule.
- 20 per cent said, when it was hot and dry.

Unfortunately, the research also found many automatic irrigation systems were not properly adjusted and were using twice the amount of water than what was required. Obviously this is not only poor water use, it can also create disease problems.

Establishing a lawn in Australia

Turf that has just been laid needs frequent watering for the first seven to 14 days, possibly up to two or three times a day if in full sun. Remember, watering can include rainfall and less water is required for shaded areas.

Once established though, a lawn in full sun consisting of Couch, Kikuyu, Soft Leaf Buffalo or Zoysia would typically require:

- **East coast (Melbourne to Brisbane):** weekly watering during Summer and Spring, with twice a week needed on soils that are sandy or shallow.



AUSTRALIAN AND US STUDIES SHOW THAT THE MAJORITY OF HOME OWNERS DO NOT KNOW HOW MUCH WATER IS REQUIRED BY THEIR LAWN...

- **Canberra and the western slopes of the Great Dividing Range:** twice a week in Summer and Spring.
- **Adelaide and Perth:** two to three times a week in Summer and Spring, weekly in Autumn.

Again, note that watering can include rainfall and less water is required for shaded lawns.

More water is needed for cool season grasses (Ryegrass, Fescues and Bentgrass) which are typically grown in colder areas or high profile sites due to their superior winter colour. Generally speaking, Tall Fescue varieties use less water than other cool season turf species.

How can I reduce the water required by my lawn?

As mentioned above, different turf species and varieties have different watering needs. Newly bred Couch varieties have been shown to use 38 per cent less water than existing varieties and Australian native turf varieties are now available, such as 'Nara' Zoysia.

Queensland Blue Couch, Carpet Grass, most Soft Leaf Buffalo's, Zoysia's and Tall Fescue varieties are known to be more water efficient than alternatives, with many being region specific. Your local turf grower can recommend the most suitable low water use species for your climate and soil type.

Visit www.turfaustralia.com.au to find a local turf grower in your region.



Site preparation and installation

Possibly the most effective thing you can do to minimise lawn watering requirements is ensure proper site and soil preparation prior to laying turf. Consider the size, slope and aspect to ensure neither poor drainage nor over exposure will adversely affect your proposed lawn.

A soil test will go a long way to understanding the onsite water holding capacity and indicate what soil amendments, including compost and/or organic matter, can be applied. Ideally a quality topsoil suitable for turf should be spread out at up to 180mm depth and a starter fertiliser applied prior to laying.

Watering should take place within an hour of laying, and using a roller after laying will ensure good root contact with the topsoil and minimise water wastage during establishment.

Mowing

When mowing, do not 'scalp' the lawn and don't cut more than one-third of the lawn's height, ideally leaving it 4cm or more higher. This encourages a deeper root system and the longer grass blades shade the soil, reducing evaporation. Shaded lawns, also, require a higher cutting blade height as well as sharp mower blades to reduce plant stress and water loss.

And finally, using a 'mulching' mower returns valuable organic matter back to the soil, further reducing water requirements.

Watering

Ideally, water early in the morning (before 10am) and water only when the lawn is showing signs of stress. For example, if you step on the lawn and the grass doesn't spring back, it needs water. Similarly, if the grass blades are curled and/or change colour, it is time to water if no rain occurs.

Remember long, slow soakings that allow water to penetrate to a depth of about 15cm encourage a deeper, hardier root system. Aerating your lawn can also aid infiltration, particularly in compacted or high traffic areas.

Fertilising

US research shows that a lightly fertilised lawn uses up to 30 per cent less water than an unfertilised lawn of the same grass type. Typically, an Australian home lawn requires a basic lawn fertiliser only twice per year, in Autumn and Spring, while higher use areas may benefit from additional fertiliser and extra watering.

There are a large variety of lawn fertilisers commercially available. Alternatively, a diluted spray of the liquid drained from a composting worm farm is an ideal fertiliser that also returns waste to the soil.

Pest Management

Luckily, most lawns that consist of a suitable variety or mix or varieties, have been installed properly and maintained with appropriate mowing, watering and fertilising will thrive. However, sometimes pests, particularly lawn grubs, can cause turf to

struggle. Various pesticides are commercially available and your local garden adviser should be able to provide advice.

Can natural turf sporting fields use less water?

Did you know that more than half of the sporting fields in Sydney are not irrigated? These sporting fields rely solely on rainfall and water stored in the soil to meet their watering requirements.

As the usage of sporting fields increases, however, so do their watering requirements. In New South Wales, the Award Winning *Lake Macquarie Sports Field Improvement Program* resulted in saving about 50 megalitres of water per year, while at the same time improving playing surfaces.

The Lake Macquarie City Council used more than 2000 cubic metres of compost to improve soil condition and increase water retention. Water savings have also been achieved through using a central irrigation control system to enhance the scheduling of irrigation and monitoring of irrigation system performance.

The monitoring functions with the central control system have enabled system failures, such as pipe bursts and faulty valves, to be quickly identified and rectified. Inefficient irrigation components, such as sprinklers and nozzles, were identified and replaced while the entire system has been optimised for performance.

New, but simple, technology

While a significant proportion of Australia's more heavily populated areas receive, on average, an adequate volume of rainfall to sustain turf, there are areas and periods of time when rainfall is not adequate.

The Queensland based Sports Turf Research Institute (STRI) has developed a 'blue2green' system which enables turf installations to be environmentally sustainable by catching, storing and reusing rainwater to automatically irrigate the turf, without the use of tanks, sprinklers, pipes or pumps.

The 'blue2green' system consists of moulded plastic pods which interlock together, at a prescribed depth, under a turf installation. The plastic pods effectively catch rain water and hold it where the turf root system can reach and are robust enough for sports to be played on and heavy machinery to be driven over it. The 'blue2green' system reduces or eliminates the need for irrigation.

Another simple but useful technology is using a soil probe for observing and feeling the soil at various depths for moisture.

Continued...





Your lawn needs less water than you think (cont.)

What are the benefits from having lawns and natural turf sporting fields?

In parts of the more densely populated areas of Australia, rainfall alone can be sufficient for turf to survive. In many other areas, however, occasional watering during dry periods is all that is required if the lawns have been installed and managed properly.

However, in other lower rainfall areas and/or if a high use of the lawn or natural turf sporting field occurs, regular irrigation may be required at certain times throughout the year.

So the question is, do the benefits of natural turf make it worth watering?

The many benefits of natural turf can be listed under the following three categories:

Functional

- Soil erosion control
- Dust prevention
- Rain water entrapment and ground water recharge
- Solar heat dissipation
- Glare reduction
- Organic, chemical and pollutant entrapment and degradation
- Air pollution control
- Fire prevention
- Environmental protection
- Improves visibility, for example, next to roads

Recreational

- Low cost surface
- Improves physical and mental health
- Provides a safety cushion
- Enhances community interaction and spectator experiences

Aesthetic

- Provides visual beauty
- Improves quality of life
- Increases community pride
- Significantly increases property values
- Complements trees and shrubs in the landscape.

In addition to the above, the side effects from no longer watering lawns can result in the death of trees and/or shrubs in the landscape.

To sum up:

- Generally speaking, most people do not know how much water their lawn needs to survive and many overwater.
- New water efficient turf species and varieties are available and your local turf grower can provide advice, visit www.turfaustralia.com.au.
- Once established, many lawns in Australia can survive on rainfall alone and many more require minimal irrigation.
- Good site preparation and appropriate turf installation will significantly improve water use efficiency.
- Raising the mowing height, especially in shaded areas, can conserve water.
- Aerating lawns can aid infiltration, particularly in compacted or high traffic areas.
- Lightly fertilised lawns can use up to 30 per cent less water.
- Adding amendments and compost to turf soils can significantly improve their water holding capacity.
- New simple technologies, such as the 'blue2green' system, can reduce or completely remove the need for turf irrigation.
- Efficient irrigation systems that are used judiciously, monitored for breakages and worn components replaced, will reduce water usage.
- Watering early in the morning and only when the turf is showing signs of stress can save considerable amounts of water.



For more information:

Turfgrass Water Conservation Alliance, www.tgwca.org

Outdoor Water Use, Australian Government: Your Home, www.yourhome.gov.au/water/outdoor-water-use

Water Right – Conserving Our Water, Preserving Our Environment, published by The Lawn Institute, www.thelawinstitute.org

Water use in turf and gardens study, Western Sydney University.

Acknowledgments :

Many people and organisations have helped provide information contained in this *Turf Facts*, including:

- Dr Mick Battam, AgEnviro - Open Space Landscapes Assessment Specialists, www.AgEnviro.com
- Matt Roche, Australian Sports Turf Consultants, www.astcs.com.au
- Sports Turf Research Institute, www.stri.com.au
- Ozbreed, www.ozbreed.com.au
- Lawn Solutions Australia, www.lawnsolutionsaustralia.com.au

Planning or expanding a turf farm

Setting-up a new or expanding an existing turf farm without good planning is a recipe for disaster.

With most viable turf growing land in Australia costing \$20,000 or more per hectare (ha), a grower cannot afford to make mistakes – they must first do their homework.

To understand and justify your turf business development you will need to undertake significant research, including:

- Understanding your market
- Growing the right turf varieties
- Knowing the characteristics of your soil and site
- Environmental considerations
- Local community expectations
- Water use requirements
- Knowing your state and local government rules and regulations

- Familiarising yourself with new growing, harvesting and transporting techniques
- Effective marketing and pricing strategies

This edition of *Turf Facts* can help a turf grower plan for a profitable and environmentally sustainable new property or expansion, meet council requirements (where applicable as these vary across Australia) and maintain a 'social licence' to operate into the future.

Land use planning for turf farms

Different state governments and local councils have different planning requirements for sustainable agricultural development, including turf, on rural lands. A grower may need to address certain requirements with local consent from authorities (local council or state government) through a *Development Application* (DA).

The DA can be used to help identify areas most suited to agricultural development, ensure ongoing support for long-term agricultural investment and help determine land use regulations along with water allocations.

Refer to *Appendix 1* for information required in a DA. Further land-use planning information and turf farm development requirements should be sought from your local council.

Continued...

Planning or expanding a turf farm (cont.)

Environmental protection

Planning to maintain and/or improve our environment is becoming an increasingly important issue.

Most development approvals are the responsibility of local council authorities who may vary planning and approval requirements within the various State Government environmental legislations.

For example in New South Wales (NSW), turf farms are classified as designated developments, under the Environmental Planning and Assessment (EP&A) Act (1979), when they satisfy the following location criteria:

- (i) Within 100 metres (m) of a natural waterbody or wetland, or
- (ii) In an area of high water table or acid sulphate, sodic or saline soils, or
- (iii) Within a drinking water catchment, or
- (iv) Within 250m of another turf farm, or
- (v) Because of their location, are likely to significantly affect the environment.

Site selection

Well sited turf farms should match the land and soil capability for cropping. The NSW Office of Environment and Heritage has mapped land and soil capability classes to determine degradation risks. Land capability is classified into three classes. Classes 1 and 2 have the best capability to be intensively cropped. Class 3 land is also capable to withstand cropping, however, standard management practices are required to minimise or avoid issues such as soil erosion, sedimentation and nutrient run-off into local waterways. Check with your local government authorities before siting or extending a turf farm to ensure will not contravene existing land classifications.



THE MOST COSTLY TURF TO GROW ON A TURF FARM IS THAT WHICH CANNOT BE HARVESTED. PLANNING YOUR SOIL, IRRIGATION AND DRAINAGE MANAGEMENT IS ESSENTIAL PRIOR TO DEVELOPING YOUR TURF FARM.

Soil management

It is in every grower's interest to protect the topsoil of their farm and the following recommendations can assist in ensuring continued productivity:

- Collate soil data to prepare a **Soil Management Plan** that addresses and prevents the loss of top soil. Refer to *Appendix 1* for required soil data information.
- Maintain a vegetative buffer surrounding the production area with at least 80 per cent groundcover to reduce erosion risk and dust/sediments entering waterways.
- Apply rubber matting, sand, asphalt, cement or rubble to high traffic areas to reduce dust, mud and soil erosion.
- Avoid slopes greater than 10 per cent due to the increased risk of soil erosion, particularly if minimal vegetation (however a slight slope encourages drainage).
- Use soil aerators where appropriate to ensure water and nutrients are incorporated into the soil and to minimise runoff. Aeration straight after harvest followed by an addition of poultry manure to manage compaction and encourage quicker re-growth has been reported to provide up to 50 per cent quicker re-growth for up to four weeks after the harvest.

Water management

Irrigation is essential for turf farming and turf farm developments should consider the following:

- Preparation of an **Irrigation and Drainage Management Plan** that demonstrates how the water will be managed. This should describe the irrigation system and proposed scheduling along with a Water Budget that provides figures on rainfall, evapo-transpiration, runoff and infiltration, etc...
- The suitability of the soils in the proposed turf area for irrigation, including soil texture, depth and hydraulic conductivity.
- Confirmation of lawful access to water including suitable quantity, quality and reliability. The use of ground/surface water or access to an irrigation scheme usually requires a licence or approval. Typically, turf production requires 6 to 8 mega litres (ML) / ha / year however, increasing soil organic matter can reduce water requirements.
- The impact of surface water runoff from turf farms during storm events. These events can transport soil, weed seeds, pesticides and fertilisers including manure into waterways. Excessive nutrient or water extraction can also affect groundwater. Assessments of turf farming proposals are usually more vigorous where natural water systems may be affected.
- Turf farms within 100m of a natural water body, in areas of high water table and within a drinking water catchment may trigger development restrictions. It is imperative growers' check their state's EP&A Act before establishing an irrigation system.
- Tail-water or stormwater collection dams should be constructed (except in high flood zones). Structures should be large enough to contain the first 10 millimetres (mm) of runoff from the turf farm.
- Appropriate management of fertilisers and pesticides to avoid negative impacts to groundwater.

Recommended management practices to reduce some water issues, include:

- Maintaining grass or plant covered buffers between turf harvesting areas and waterways to assist in reducing erosion and runoff.



Your choice of irrigation will affect your turf farm efficiency and overall profitability.

- Where practical, manage surface water by separating “clean” (rainwater) from “dirty” or grey water. Water from washing down equipment can pollute waterways and should be directed to grassed areas before it leaves the property.
- Recycled water can be productively reused on paddocks.

Manure management

Fertilisers, soil improvers and manures commonly used on turf farms can pollute water bodies. Each state's Department of Agriculture or Primary Industries should have information which addresses manure management practices, such as:

- A list of the most commonly used fertilisers/manure, quantities and associated methods of application and storage.
- Ensuring an ongoing soil test regime to determine nutrient requirements.

Poultry manure can emit an odour (ammonia) and attract flies, particularly during hot weather. It can also contaminate waterways. Overloading fertiliser on soils will additionally create a nutrient imbalance that can contaminate runoff and ground water and encourage weed and algal growth, which chokes the waterways.

sunlight is strongest during the middle of the day will assist in the breaking down of odorous particles.

- Spread manure when turf is adequately re-established, usually when there is at least 25 per cent groundcover.
- Spread manure when people are not normally at home, such as during school hours.
- Where suitable, keep neighbours informed, allowing them time to prepare for the event by closing windows and bringing in any washing.
- Balance the application of manure (and fertiliser) with crop nutrient needs.
- Site the manure bay/composting area downwind from nearby neighbours.

(refer to *Turf Australia Spring 2016 - Growers need to understand nutrient requirements of their turf*. The article by Dr Mick Battam from AgEnviro Solutions is an important reference for growers in terms of understanding the importance of soil and turfs' nutrient requirements.)



On farm storage and spreading of poultry manure requires careful management for optimal turf growth and to maintain your social licence to operate within your community.

CARE SHOULD BE TAKEN WHEN SPREADING MANURE TO AVOID CONTAMINATING ROADWAYS ...

Leaching is the downward movement into the soil of water borne nutrients – this would occur to some extent to manure piles exposed to rain. Poultry manure will form a sealed surface crust once it dries, however if a stockpile is delivered in a dry state it does not always have a crust. Until this crust forms, odour levels are at their highest in this wet state. Therefore, if manure is stockpiled, avoid flood-prone sites and/or spread it as soon as possible. Ideally manure should be stored in a purpose-built covered loading bay with an impervious base.

Care should be taken when spreading manure to avoid contaminating roadways, waterways and significant drainage lines:

- Poultry manure piles should be located above dams or diversion drains so that any released nutrient is captured before overflow to waterways.
- Spread manure when climatic conditions are favourable, for example, no wind, or when the wind is blowing away from populated areas and on a sunny day. Spreading when the

Emergency management plans

Planning for emergencies (flood, storms or fire) at a local and individual business level allows better coordination of emergency management responses by the relevant authorities.

Emergency plans should:

- Identify and analyse the likely risks.
- Consider preventative measures to minimise risks.
- Identify responses and responsibilities where equipment, for example, irrigation pumps, tractors, turf cutters may need to be moved from low lying areas during floods.
- Identify strategies for recovery, such as financial and operational arrangements.

Amenity risks and potential conflict management

Turf farms can produce off-site environmental impacts such as noise, drift of herbicide sprays and odour when poultry manure or any nutrient is being spread. These may cause conflict, particularly with nearby residents. A **Property Management Plan** (PMP) is a tool to help demonstrate how potential environmental impacts of a proposal can be adequately managed (refer to *Appendix 1*).

The PMP could include the following:

Separation Buffers

The determination of appropriate separations should take into consideration distance, terrain, vegetation, landform and adjoining land use. Consent authorities will need to determine who provides the separation areas and the grower may need to justify the separation distances proposed, such as ensuring separation between:

- Water bodies (generally at least 20m)
- Dwellings (generally at least 100m), and
- other developments.

Pesticides and Herbicides

The potential for pesticide/herbicide drift onto non-target areas such as vegetable crops should be addressed. In particular, assess the possible impacts of using hormonal type herbicides (for example, 2,4-D, MCPA).

Keep a Register or Log Book of pesticides/herbicides proposed to be used and their application according to the label use conditions. Contact your local relevant State Department for more advice.

Noise

Noise complaints can arise from turf farming activities. A map of your proposed development should indicate the location of neighbours and any form of mitigation, such as designated areas for trees and/or shrubs.

For instance, the NSW Industrial Noise Policy specifies noise at a residence in a rural area should not exceed 55 decibel (dB) between the hours of 7am (8am Sun) and 6pm, 50dB between 7pm and 10pm and 45 dB between 10pm and 7am. In rural areas where the dwelling is remote from the boundary, the point of measurement should be within 30m of the complainant's dwelling on the side closest to the noise. The general noise level targets for protecting against intrusive noise is the background noise level plus 5dB. The Office of Environment and Heritage has various guides on noise control and regulation for each state.

Hours of operation

Turf farms should not subject to restricted hours of operation, however, night operations should comply with noise regulations.

Traffic generation

Turf farms generate traffic by employees, suppliers, operations and the sales process. The establishment of a new turf enterprise, or an expansion, will generally increase the level of traffic on local roads.

Assess the number of vehicle movements per day and the effect such increases will have on the normal traffic flow on the access road(s).

Note the suitability of entrances to the turf farm, with respect to road safety.

Waste management

Turf farms have the potential to generate small amounts of waste. Examples of wastes are used pesticide containers, fertiliser bags, fuel drums and unsaleable turf rolls which will all require management.

The proposed method of waste disposal and handling should be included in any turf farm development proposal.

Work Health and Safety

(refer to *Turf Facts* Production 2016-09 – *Safety Culture Pays Off*)



Turf farms are often located on a urban fringe and, as a result, farming practices need to be acceptable to the local community.

For more information:

Each State's Department of Primary Industries has additional web based information as well as publications related to planning for agricultural establishment:

QLD - www.daf.qld.gov.au

NSW - www.dpi.nsw.gov.au

VIC - <http://agriculture.vic.gov.au/agriculture>

WA - www.agric.wa.gov.au

See also:

Preparing Intensive Plant Agriculture Developments, 2011 - http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0009/422982/Preparing-intensive-plant-agriculture-development-applications.pdf

Assessing Intensive Plant Agriculture Developments, 2011 - <http://www.dpi.nsw.gov.au/content/agriculture/resources/lup/development-assessment/plant-devs>

Best Practice Guidelines for using poultry litter on pastures, 2011 - http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/140359/Best-practice-guidelines-for-using-poultry-litter-on-pastures.pdf

Land Use Conflict Risk Assessment (LUCRA) Guide, 2011 - http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0018/412551/Land-use-conflict-risk-assessment-LUCRA-guide.pdf

Living and Working in Rural Areas, 2007 - www.dpi.nsw.gov.au/_data/assets/pdf_file/0020/210188/Living-and-working-in-rural-areas-Ch0.pdf

Planning for turf farms, Prime Fact 1320: http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0020/504722/Planning-for-Turf-Farms.pdf

Land and soil capability maps:

QLD - www.qld.gov.au/environment/land/soil/soil-data/

NSW - <http://mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home>

VIC - http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/land_capability

WA - www.agric.wa.gov.au/land-use-planning/land-capability-assessment

Appendix 1:

Information to include in a Development Application (DA) or when preparing a Property Management Plan for a turf farm.

Physical soils data

- Depth of a horizon
- Depth to water table (can be estimated from relevant published information)
- Depth to bedrock (can be estimated from relevant published information)
- Particle size analysis
- Dispersion
- Plastic limit
- Infiltration capacity
- Hydraulic conductivity (permeability)

Water data

- Evapo-transpiration
- Water Budgets
- Chemical soils data (for both top soil and sub-soil)
- A standard full analysis including pH, EC (salinity), P, S, Cl, exchangeable cations and organic matter

Meteorological data

- Wind direction
- Rainfall
- Evaporation

Developing your turf farm is not all about the turf growing aspects, it also requires knowing what turf varieties to grow along with effective marketing and pricing strategies.

Property plan

The plan should:

- be at a scale of 1:1000 to 1:4000
- show topographic features
- show Northcote soil types
- show existing vegetation (type and location)
- show land capability (potential for erosion) and agricultural land suitability classes
- indicate areas to be cleared (if any)
- indicate erosion and sediment control structures which are in place, proposed or approved
- indicate locality plan and details of proposed development
- indicate proposed buffer zones
- indicate land uses on adjacent lands
- show buildings
- indicate adjacent development, including residential, rural residential, towns and villages
- show water courses and other water bodies

Topographic Map

A topographic map to identify features of the site:

- slope gradients (maximum gradient 10 per cent)
- existing erosion (including stream bank erosion)
- drainage pattern
- water courses, wetlands
- areas subject to flooding – especially buildings
- contours/banks



Wise Turf Farm Planning advice from fellow growers:



Adrian Pitsikas, Greenacres Turf Group, Western Australia

An economic rationale for any turf farm expansion is needed. Don't just expand because you can, this is a recipe for disaster. To understand and justify your economic rationale, you need to do your research, specifically:



- **Market research:** Including new housing approvals; infrastructure and community developments; landscaper, garden and lawn maintenance service expansion; turf variety selection; etc...
- **Researching, predicting and monitoring water use:** Large developments involving water usage in Western Australia (WA) require ongoing water use monitoring by a third party and provision of quarterly reports.
- **If larger irrigation pumps are required:** Talk with your electricity supplier to ensure if the current electricity infrastructure can provide the increased power capacity. If not, the expense required to upgrade your power supply will need to be researched and considered.
- **Gaining the appropriate state and local government approvals:** Including land use planning and, the big one in WA, water allocation. A total of 11 government approvals were required for the most recent expansion of Greenacres Turf Group. This included negotiations with the Local Council, the Local Landcare Group, the Department of Agriculture, the Department of the Environment, and, the big one, the Department of Water.
- **A mandatory consultation period:** During which the proposed development needs to be advertised and neighbours consulted.
- **If expanding and your business goes over certain threshold levels:** Such as payroll or turnover, you may be liable for additional taxes, such as payroll tax, or subject to other regulations, such as unfair dismissal legislation.



John Keleher, Australian Lawn Concepts, Queensland

Assessing the viability of your proposed turf farm development or land acquisition is essential. This not only includes determining the profitability of a growing premium versus a common grass variety, it also includes where are you going to get new information and best practices from?



From my experience, it pays to ensure the best ground preparation right from the start. This includes laser levelling, drainage and soil preparation as all these things have a big bearing on the resulting crop performance.

Also, stewardship of the land, and your activities on it, are very important. Every turf farm is part of community and therefore has a social responsibility to consider. By keeping the presentation of all of your farm blocks like they are prepared for sale can help, and you may be able to capitalise on an unexpected sale opportunity.

Get involved with and support your farming and turf associations. Field days, conferences, seminars and farm tours will help you keep abreast of technological development and adopt new practices like 'Precision Farming'.

Importantly, determine your acceptable level of profitability and pay close attention to marketing. Growing turf these days is easy. The hard bit is receiving the best, most profitable return for your product.

As turf farms sell direct to the end user, turf growers are in control of the retail price of turf. Your marketing and pricing strategies, therefore, need to ensure your customers recognise the inherent value of turf and other areas of value-adding (such as delivery and lawn care products) should also be considered.

And finally, use management systems that are world class. Environmental management, Work Health & Safety, industrial relations, accounting (for profit and for tax purposes), production, order management and transporting are all important components of, in many cases, multi-million dollar turf farm businesses. As the business owner, it is your job to manage the lot and not adopt a 'she'll be right' attitude. You need to set high standards for you and your staff from the start, which includes transparency and accountability across all fronts of business management.

Acknowledgements

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Andrew Docking, NSW Department of Primary Industries

John Keleher – Australian Lawn Concepts

Adrian Pitsikas – Greenacres Turf Group

Disclaimer:

The information contained in this publication is based on knowledge and understanding at the time of writing (October 2016). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent adviser.

Published by Turf Australia.



The difference between the price and value of turf

A phone survey conducted on 194 turf growers and suppliers across Australia found that the average prices of the three main turf varieties increased by up to 60 cents per metre square.

The survey conducted in October 2016, is the latest in a series of ongoing *Secret Shopper* surveys to correlate accurate figures on the actual price of turf across Australia.

The survey found that the price of:

Soft Leaf Buffalo in Australia was, on average, \$11.40 per square metre in October 2016, which is up from \$10.80 in November 2014.

The average price for Couch was \$6.78/m², up from \$6.27/m²

Kikuyu was now selling for \$6.99/m², up from \$6.65/m² back in November 2014.

A glance at the Sydney market

The Sydney turf market price is still the lowest in Australia despite an 18 per cent increase in the price for Soft Leaf Buffalo from New South Wales (NSW) metro growers since November 2014.

In addition, the price charged for turf delivery in NSW is not covering delivery costs in Australia's largest and most congested city.

Continued...

The difference between the price and value of turf (cont.)

A recent estimate of delivery costs for a pallet of turf in the five major capital cities found that Sydney had the highest delivery costs by a substantial amount.

For example, the average delivery time per pallet in Sydney is 50 minutes, at a cost of \$124, while the average delivery time in Perth or Adelaide is 20 minutes at a cost of \$50. In addition, estimated annual tolls in Sydney is \$3650 while both Perth and Adelaide do not have tolls (See Table 1).



More turf growers are now charging for delivery and Sydney has the highest delivery costs.

Table 1: Estimated delivery costs in five Australian capital cities

| City | Estimated tolls (per year) | Average delivery time & costs per pallet | Average delivery price charged by growers in October 2016 |
|-----------|----------------------------|--|---|
| Perth | \$0 | 20 minutes = \$50 | \$85.73 |
| Adelaide | \$0 | 20 minutes = \$50 | \$42.25 |
| Brisbane | \$1300 | 30 minutes = \$75 | \$88.63 |
| Melbourne | \$2777 | 35 minutes = \$87 | \$92.27 |
| Sydney | \$3620 | 50 minutes = \$124 | \$73.36 |

A look at the price of key turf varieties across the country

The October 2016 Secret Shopper Phone Survey found the price of Soft Leaf Buffalo varied across Australia by 104 per cent, compared to a 123 per cent variation back in November 2014. The main reason for this reduced variation is an 18 per cent price increase for **Soft Leaf Buffalo** from NSW metro growers, up from \$7.06/m² in November 2014 to \$8.32/m² in October 2016 (See Table 2).

Table 2: Turf price survey October 2016 - Soft Leaf Buffalo

| Supplier Segment (sample size) | Average price per m ² for 145 m ² | Average delivery cost (if charged) for 145 m ² | Percentage of businesses offering free delivery |
|--------------------------------|---|---|---|
| SE Queensland Growers (21) | \$10.51 | \$88.63 | 10% |
| SE Queensland Resellers (29) | \$11.95 | \$80.48 | 7% |
| Nth Queensland Growers (12) | \$9.21 | \$92.36 | 8% |
| NSW Metro Growers (30) | \$8.32 | \$73.36 | 47% |
| NSW Regional Growers (22) | \$8.99 | \$70.12 | 32% |
| NSW Resellers (22) | \$9.67 | \$58.13 | 14% |
| Victorian Growers (13) | \$11.27 | \$92.27 | 15% |
| Victorian Resellers (17) | \$12.59 | \$98.92 | 24% |
| SA Growers (8) | \$11.40 | \$42.25 | 38% |
| SA Resellers (4) | \$12.17 | \$29.00 | 75% |
| WA Growers (12) | \$12.10 | \$85.73 | 8% |
| WA Resellers (2) | \$12.98 | \$80.00 | 50% |
| Northern Territory (2) | \$17.00 | n/a | 100% |
| TOTAL AVERAGE (194) | \$11.40 | \$74.27 | 32.92% |

While NSW metro growers remain the cheapest turf market in Australia, more NSW metro growers (53 per cent) are now charging for turf delivery. This is up from 26 per cent charging for delivery in November 2014, and no NSW metro growers charged for delivery back in April 2014.

The October 2016 *Secret Shopper Phone Survey* also found that the price of **Couch** varied by up to 175 per cent across Australia, with:

- The lowest price being \$4.18/m² in North Queensland
- The highest price being \$11.50/m² in the Northern Territory
- The average price being \$6.78/m², up from \$6.27/m² in November 2014
- Across the State and Territories, only 29 per cent of suppliers were also offering free delivery for 145/m² of Couch (See Table 3).

The relationship between supply and demand

Supply and demand is perhaps one of the most fundamental concepts of economics and it is the backbone of a market economy like Australia's.

Demand refers to how much (quantity) of a product or service is desired by buyers. The quantity demanded is the amount of a product people are willing to buy at a certain price; the relationship between price and quantity demanded is known as the demand relationship.

Supply represents how much the market can offer. The quantity supplied refers to the amount of a certain good producers are willing to supply when receiving a certain price. The correlation between price and how much of a good or service is supplied to the market is known as the supply relationship. Price, therefore, is a reflection of supply and demand.

Despite this, the phone surveys show that some turf suppliers, particularly NSW Metro growers, did not raise their turf price even though they acknowledge there is a market shortage and they themselves could not supply immediately.

This is a poor business practice as it results in consumers and customers unnecessarily undervaluing turf, lower business profitability and sustainability, and, most importantly, restricts the professional development of our turf industry.

Table 3: Turf price survey October 2016 - Couch

| Supplier Segment | Average price per m ² for 145 m ² | Average delivery cost (if charged) for 145 m ² | Percentage of businesses offering free delivery |
|------------------------------|---|---|---|
| SE Queensland Growers (16) | \$5.08 | \$85.46 | 19% |
| SE Queensland Resellers (29) | \$6.01 | \$81.88 | 10% |
| Nth Queensland Growers (13) | \$4.18 | \$88.73 | 15% |
| WA Growers (10) | \$7.12 | \$85.80 | 0% |
| Northern Territory (2) | \$11.50 | n/a | 100% |
| TOTAL AVERAGE (70) | \$6.78 | \$85.47 | 28.80% |

The same phone survey found that the price of Kikuyu varied by up to 92 per cent across Australia with:

- The lowest price being \$4.71/m² (NSW regional growers)
- The highest price being \$9.02/m² (Victorian resellers)
- The average price being \$6.99/m², up from \$6.65/m² in November 2014
- 42 per cent of suppliers offering free delivery (See Table 4)

Table 4: Turf price survey October 2016 - Kikuyu

| Supplier Segment | Average price per m ² for 145 m ² | Average delivery cost (if charged) for 145 m ² | Percentage of businesses offering free delivery |
|----------------------------|---|---|---|
| NSW Metro Growers (24) | \$4.98 | \$72.55 | 54% |
| NSW Regional Growers (19) | \$4.71 | \$68.00 | 32% |
| NSW Resellers (17) | \$5.63 | \$61.39 | 18% |
| Victorian Growers (11) | \$7.88 | \$92.27 | 0% |
| Victorian Resellers (16) | \$9.02 | \$98.92 | 25% |
| SA Growers (9) | \$7.96 | \$46.33 | 67% |
| SA Resellers (4) | \$8.73 | n/a | 100% |
| TOTAL AVERAGE (100) | \$6.99 | \$73.24 | 42.29% |

The difference between the price and value of turf (cont.)



Consumers believe turf is worth \$15 or \$20 m², supply only.

The value of turf

Customer perceived value is the difference between a prospective customer's evaluation of the benefits and costs of a product when compared to alternatives.

Consumer research shows that Australian consumers already recognise and value the many benefits of turf and are willing to pay \$15 or \$20 per m², supply only. This is reflected in market research where consumers recognise the many benefits of turf and therefore attribute a high value to it. Consumers believe turf:

- Brings nature to the home
- Is appropriate for children
- Is environmentally friendly
- Is aesthetically pleasing
- Is a vital component of a garden
- Adds value to a home
- Provides a 'quality' and 'long lasting' surface
- Is great for outdoor entertaining

In addition, independent contract landscaping rates reveal that, when compared to pavers, synthetic turf, sandstone, concrete and mass garden plantings, natural turf is by far the cheapest ground cover option. This remains true even when site preparation, supply and installation costs are factored in (See *Turf Facts* No. 2015/05, *How the cost of natural turf compares with alternative ground covers*).

Essentially, turf can turn a house into a home and a hot urban space into a cool, refreshing oasis. Even if consumers and customers need to be reminded of the many and unique benefits of turf, they will still try to buy it for the cheapest price. It is, therefore, up to the turf seller (grower) to ensure the value of turf is not diminished.

As the majority of Australia's turf growers sell directly to consumers, turf growers have control over the market price.

Consequently, the opportunity exists for Australia's turf industry to improve its professionalism and profitability by reminding all customers of the many benefits and high value of natural turf.

For example, research shows a house with a natural turf lawn can increase its property value by 10 to 15 per cent, even up to 18 per cent. As the average house price in Sydney has reached almost \$1,000,000, having a good lawn around an average Sydney home can easily be worth more than \$100,000. This is not an insignificant amount and it reflects the high inherent value of turf.

Ensuring the high value of turf is not compromised

- **It is the role of the turf seller to remind all customers of the many and varied benefits provided by turf**
- **Do not under value turf. Consumers believe its value is about \$15/m², or even \$20/m², supply only!**
- **Have a pricing strategy that takes into account the many inherent benefits of turf, the continual rising costs of inputs (such as fertiliser, machinery and labour), include the services you offer (such as delivery, quality and local acclimatization)**
- **Review your prices regularly (either quarterly or every six months)**
- **Talk with your Accountant and ask: "What do I need to know to better understand and manage my businesses profitability?". If you get a blank response, get a new Accountant**
- **When asked: "How much is your turf?" do not respond with a price. Instead:**
 - **Engage in a conversation**
 - **Ask for what purpose do they want the turf and what are their specific issues**
 - **Sell the many benefits of turf**
 - **Promote the value provided by your business (for example, good service, quality product, acclimatized to your local area, etc...)**
 - **Talk about the value your turf will provide to your potential customer**
- **Remember, you do not want every potential sale. You only want the sales where the customer recognizes the inherent value of turf.**

For more information on the **price of turf**, refer to:

- Turf Facts* No. 2015/04 *The actual price of turf across Australia*
- Turf Facts* No. 2015/05 *How the cost of natural turf compares with alternative ground covers*
- Turf Facts* No. 2015/06 *Knowing how much it costs you to produce turf*

For more information on the **value of turf**, refer to:

- Turf Facts* No. 2014/01 *The real differences between natural turf and synthetic grass*
- Turf Facts* No. 2015/03 *How consumers value turf*
- Turf Facts* No. 2015/07 *The environmental benefits of turf grass*
- Turf Facts* No. 2016/10 *Your lawn needs less water than you think*

The information contained in this publication is based on knowledge at the time of writing (November 2016) and maybe subject to change. This information is generic in nature and professional advice should be sort to determine if this information is suitable for particular situations.

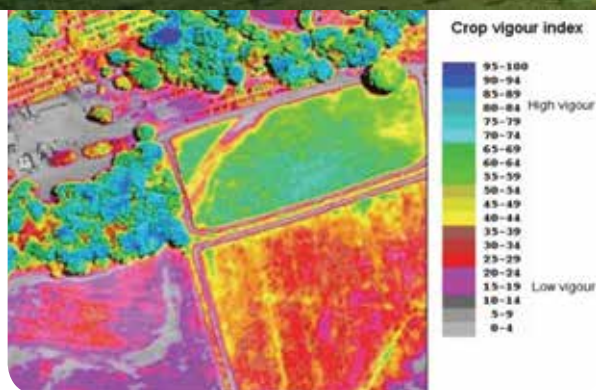
Precision farming – the new agricultural revolution for turf

In the past 10 years precision farming has moved from good science to good practice and has become agriculture's new revolution prompted by the adoption of many new technologies, such as high precision positioning systems, smart sensors and a range of Information Technology (IT) applications combined with high-tech machinery.

Put simply, it is about accurately managing production variations in the field, such as soil and water, to produce more but using fewer resources and reducing production costs. Growers, such as turf farmers, are now recognising the benefits in adopting precision farming and how it can improve both production and profitability on a turf farm.

Why is precision agriculture important?

Precision Agriculture results in improved production efficiencies, higher profitability and minimises any adverse environmental impacts of farming. While Precision Agriculture has been used successfully by Australia's broadacre cropping farmers for well over 20 years, the use within the turf industry has been almost non-existent. This, however, is changing!



Combining satellite or overhead imagery with modern crop yield index technology can provide a farm input management tool that can be automated.

In this *Turf Facts* we explain, what Precision Agriculture is, how it is currently used in Australian agriculture, how it could be used in turf farming, its potential benefits and provide actual examples from within the turf industry. This information is likely to inspire those growers who have not yet looked at Precision Agriculture to seriously consider adopting some of the technologies.

Continued...

Precision farming – the new agriculture revolution for turf (cont.)...

Precision Agriculture

Precision Agriculture (PA) involves measuring crop requirements and practices by using remote sensing, automated guidance and/or variable rate application technologies to maximise the efficiency of farming inputs. It can include practices such as:

- Variable rate irrigation
- Variable rate fertiliser applications
- Autosteer using Global Positioning Systems (GPS)
- Electromagnetic Induction (EM), Normalised Difference Vegetation Index (NDVI) and/or Gamma radiometric mapping
- Yield mapping
- Soil testing
- Obtaining agronomic advice

By identifying and measuring the variability within a paddock, PA enables the causes of variability to be investigated and the exploration of management strategies to be reviewed and simplified.

There are many factors that contribute to the variability within a paddock, including: soil attributes; terrain; management practices or environmental factors. While the magnitude of these factors affect the amount of variability within a paddock, technology now exists to better manage these inconsistencies and improve production and profitability.



GPS guidance with auto steer capability for chemical and fertilizer application.

Precision Agriculture across Australia

In 1997, the Australian Centre for Precision Agriculture conducted its first one-day Symposium on PA Research and Application in Australasia. It's aim was to provide insight into, and inspiration from, the work already being undertaken to develop and apply PA in a wide range of agricultural industries.

In 2016, the Australian Centre for Precision Agriculture conducted its 19th symposium.

Grains

PA in Australia is most prevalent in the grains industry with anecdotal evidence suggesting that the adoption of auto-steer maybe as high as 90 per cent. Auto-steer technology is often considered the first step in using PA as it is relatively simple, often results in immediate and easily seen benefits and enables familiarity with applying new technologies on the farm.

Surveys indicated that back in 2011, at least 20 per cent of Australia's grain farmers had adopted some form of Variable Rate Application (VRA) technology, with the current level of adoption anticipated to be higher. Assessments indicate up to a 10 per cent reduction in the costs of production for broadacre grain cropping through application efficiencies in addition to optimising inputs for maximum production and profitability.

Wine Grapes

While in 1999, the first wine grape yield map was produced to help improve vineyard profitability and sustainability, remote sense imagery and high resolution (EM) soil surveying have been the most commonly adopted Precision Viticulture (PV) technologies. More recent advances in PV include selective harvesting, on-the-go sensing of fruit quality and spatial variation in crop phenology.

The perennial nature of grapevines arguably makes PV easier to adopt than PA in broadacre annual grain crops. However, despite the demonstrated profitability of PV, adoption rates vary considerably but is noticeably higher in regions with a leading viticulturist who has taken on the role of 'local champion for PV'.

Sugarcane

Apart from intensive activity on a couple of sugar farms, there was essentially no widespread adoption of PA in the Australian sugar industry until the late 2000s, even though a sugarcane yield monitor was created in 1997. This has been largely attributed to the collapse of world sugar process in the late 1990s.

Nevertheless, auto-steer technology is rapidly being adopted in the Australian sugar industry and, as with the grains industry, it is expected that this will overtime result in the increased adoption of other PA technologies.

Precision Turf Farming

In comparison to many other horticultural and agricultural industries, turf farming produces a high-value crop with one hectare of high-quality turf worth well over \$100,000. In addition, turf is a perennial crop which grows and is harvested throughout the year in every Australian state and territory.

Research conducted by Dr Mick Battam, from AgEnviro Solutions, clearly shows that the nutrient requirements of turf increases exponentially from the initial paddock commencement until being ready for harvest. Also, having optimal soil moisture and appropriate pest management throughout the growth cycle will result in more productive turf farming while the variability of soil characteristics and terrain within a paddock means this can be difficult to achieve.

Precision Turf Farming (PTF) technologies mean that optimal management of these variabilities on a turf farm, within a paddock and throughout a crop cycle can be achieved. And given the relatively high value of turf, the potential return on your investment into these technologies for turf production is high.

Benefits from Precision Turf Farming

Most of us are already using new technologies such as smart phones, tablets, integrated logistics and accounting systems, etc..., so why not use PTF technologies as well to improve production efficiencies and turf farm profits?

Many factors influence the growth of turf on turf farms, including:

- Soil chemical and physical attributes
- Past and current farming practices
- Plant and/or soil nutrient status
- Topography
- Turf crop growth stage
- Climate, such as rainfall
- Insect pests
- Weeds
- Diseases

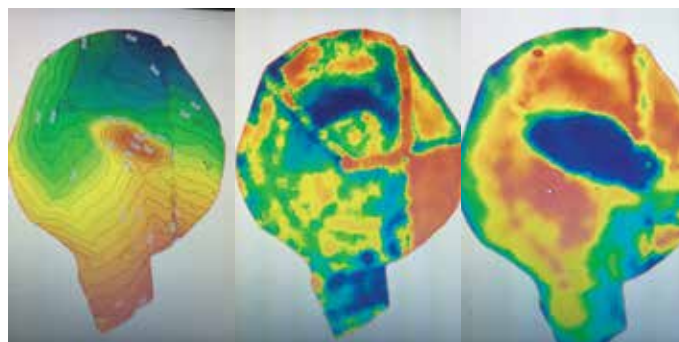
While many of these factors vary over time and vary within a paddock or block, PTF technologies can improve the effectiveness and efficiency of modern turf farm management. Arguably, the easiest PTF technology to adopt on a turf farm is GPS guidance for auto steer capability when applying chemicals and/or fertilisers.

Steering guidance systems are already available and widely used throughout agriculture and they ensure minimal overlap of chemical and/or fertilizer applications. Given the wide width of modern spray rigs, GPS guidance systems can significantly reduce chemical or fertilizer wastage, as well as reducing the time taken and labour costs involved in applications.

Moving from an 'Averaging Management System' (for example, in paddock X, all farming practices are the same) to a more measurement based, targeted and variable system does require a different mindset. However, the technology is here now for such systems to be largely autonomous.

Satellite Imagery, such as Google maps, provide useful 'terrain' information while electromagnetic Induction (EM) measures the degree of soil electrical conductivity. Soil electrical conductivity is influenced by the relationships between:

- Clay content
- Clay type (or depth to clay in duplex soils)
- Soil water
- Soil salinity



(Top) Variable rate irrigation technology allows identification of the variable water holding capacity of the soils under a pivot.

(Middle) Allocation, at the click of a mouse, of different irrigation requirements per block under a pivot depending on the turf growth stage or if it has just been harvested.

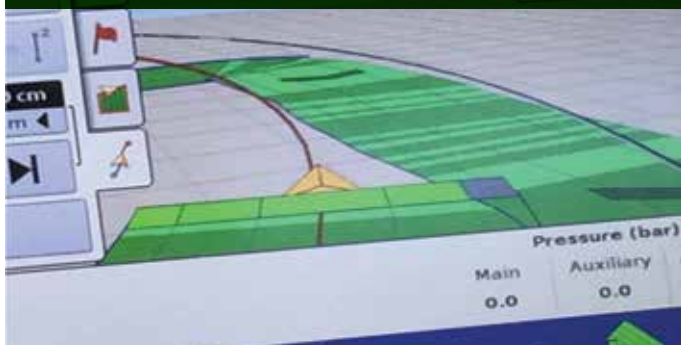
(Bottom) The result is automated variable irrigation that meets the specific turf growth needs of each m² of ground.

PRECISION AGRICULTURE HAS OVERCOME MANY CHALLENGES IN BROADACRE CROPPING, SUCH AS WASHOUTS, ROCKS, LARGE TRACTOR WHEEL RUTS AND OTHER UNSEEN OBSTACLES IN PADDOCKS COVERED WITH STUBBLE. APPLYING OA TO TURF FARMS IS RELATIVELY EASY AS THEY, BY COMPARISON, ARE OBSTACLE WITH LARGE, FLAT AREAS. OBSTACLES SUCH AS POWER POLES AND IRRIGATION EQUIPMENT ARE EASILY DETECTED.

Swarm Farms, Andrew Bate.

Continued...

Precision farming – the new agriculture revolution for turf (cont.)



Gamma radiation surveys are used to predict topsoil properties, such as texture and mineralogy, and are commonly used in conjunction with EM to improve the accuracy of predicting soil properties.

Remote sensing imagery is used to measure the variability in soil and/or vegetation, such as a Plant Cell Density (PCD) index or a Normalised Difference Vegetation Index (NDVI). These indexes can highlight the variability of biomass, leaf area and/or yield within a paddock and, particularly when overlayed with EM and Gamma Radiation survey information, provide valuable crop management information.



Examples of Precision Turf Farming

Australian Lawn Concepts (ALC) is owned and operated by John Keleher (above) and Sandy Bauman in the Gold Coast hinterland of Queensland.

Both John and Sandy have a background in broadacre grain farming, agronomy and Precision Agriculture. As a result, John and Sandy have been able to adopt the principles of Precision Agriculture and apply it to understand the unique characteristics of turf farming.

THE CHALLENGE FOR ALL TURF FARMERS IS TO USE INFORMATION AND DATA THAT IS CURRENTLY AVAILABLE ABOUT THEIR FARM TO MAKE MORE INFORMED MANAGEMENT DECISIONS. THIS WILL HELP TO BETTER OPTIMISE INPUTS INCLUDING LABOUR, ENERGY, WATER AND AGROCHEMICALS AND ACCOUNT FOR THE INHERENT VARIABILITY AND UNCERTAINTY IN OUR PRODUCTION SYSTEM.

Australian Lawn Concepts, John Keleher.

By bringing together GPS technology with remote sensing imagery, it is possible to program farm practices to be automatically modified depending on the exact location of the machinery or farm equipment.

For example, variable rate irrigation technology enables specific levels of irrigation to be applied under a pivot or lateral irrigator as required by individual areas as small as 5 per metre square. The pivot or lateral irrigation map can be easily updated daily using the click of a mouse, enabling allowances for recently harvested areas, low lying areas or roads to receive less or no irrigation.

For more information:

Applying PA – A reference guide for the modern practitioner. Published by the Grains Research & Development Corporation (GRDC). <https://grdc.com.au/~media/Documents/Resources/Publications/ApplyingPA-pdf.pdf>

Adoption of precision agriculture related practices: status, opportunities and the role of farm advisers. Published by CSIRO. www.csiro.au/en/Research/AF/Areas/Sustainable-farming/Precision-agriculture

Precision Agriculture Laboratory, including the 2016 Symposium on PA Research and Application in Australasia. Published by Sydney University. http://sydney.edu.au/agriculture/pal/research_symposia/index.shtml

In 2016, ALC invested:

- \$37,000 in auto steering technology for their boom sprayer
- \$60,000 in variable rate irrigation technology for an existing central pivot
- \$47,000 for variable rate fertilizer technology applied through an airseeder

In 2017, ALC believes it has already saved up to \$200,000 just in the first year of using these Precision Turf Farming (PTF) technologies. Many of the savings have been achieved by more targeted applications, an overall reduction of inputs, less variable turf growth, reduced labour and improved farm access as the farm access roads are no longer being irrigated.

ALC believes it has achieved stage one in implementing PTF technologies and implementation of stage two is currently in progress. Stage two will involve using multispectral imagery from aircraft, such as Normalised Difference Vegetation Index, and possibly Electromagnetic Induction and Gamma radiation technology, along with cost benefit ratios to help create turf yield maps.

If turf yield maps can be created, the concept can be reengineered to create turf waste maps which can then be down loaded to turf harvesters to improve harvest efficiencies.