



The Macadamia Nut in Australia

Inter-Row Grass Management

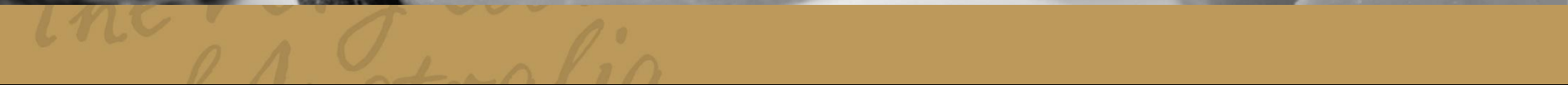
February - March 2019

Prepared by:

Matt Roche

Director and Principal Consultant





ABOUT US



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Australian Sports Turf Consultants (ASTC) provides independent consultancy advice and specialist services to the sports turf industry, turf production industry and commercial sectors. ASTC also works with other horticultural industries throughout Australia e.g. nursery, wheat and Leucaena.

ASTC also undertakes research, development and extension activities for the Australian and international organisations.

Our office is located in Brisbane, Australia.

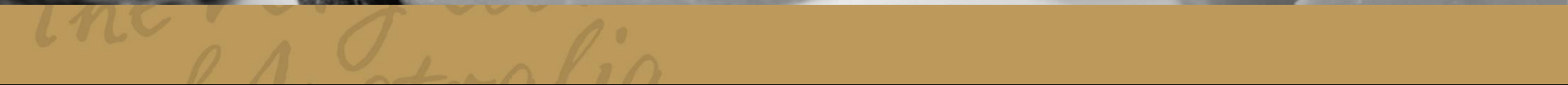


2018-2019 Partner



2018-2019 Partner





OVERVIEW

Topics covered today



OVERVIEW

- Ground cover – what do you have?
- Benefits of grass cover
- Turfgrass options
- Grass management
 - Plant Growth Regulators
 - Mowing and scarifying
 - Soil decompaction and nutrition
 - Handy tools





GROUND COVER – WHAT DO YOU HAVE?

Grass or bare ground



Ground cover – What do you have?



Bare ground



Sprayed to the dripline



Full grass cover

Benefits of grass cover

- Australian Standard AS5181:2017 for 'Use and Installation of Turf as an Erosion, Nutrient and Sediment Control'.
- Protection of inter-rows or V-drains.
- Reduces soil moisture loss (actually adding moisture), provides a more even soil temperature and improves soil structure.
- Source of mulch and carbon under the trees following mowing.





Turfgrass Options

New and improved turfgrasses



Turfgrass varieties

Desirable features:

- Is commercially available.
- Is able to grow in your environment e.g. location, soil type, inter-row spacings (shade).
- Does not impede harvesting of nuts from the ground floor.
- Vertical yet dense leaf growth.
- Preferably grows by rhizomes and stolons.
- Tolerates selective herbicides and has some pest and disease tolerance.
- Lower maintenance.

Turfgrass varieties (Cont'd)

Turfgrass species of interest:

- Sweetsmother grass
- Broadleaf carpet
- *Zoysia* spp.
- Buffalograss
- *Panicum laxum*

Other grasses being used:

- Kikuyu and green couch
- Rhodes grass
- Veld grass (vertical growth)



Turfgrass varieties (Cont'd)

Scientific name: *Dactyloctenium australe*

Common name: [Sweetsmother grass](#) (Durban grass)

Availability: Turf and seed.



Establishing and managing
smothergrass on macadamia
orchard floors

2008

Kevin Quinlan
District Horticulturist
Intensive Industries Development, Alstonville

John Wilkie
District Horticulturist
Intensive Industries Development, Alstonville

Paul O'Hare
Principal Extension Horticulturist
Maroochy Research Station, Qld DPI & F

- High shade tolerance
- Stoloniferous growth
- Mow height 35-50mm
- Can grow to 30-80cm tall

Turfgrass varieties (Cont'd)

Scientific name: *Axonopus compressus*

Common name: [Broadleaf carpet grass](#)

Availability: Yes, as a turf. Sometimes seed.



- Mow height 30-50mm
- Can grow to 15-45cm tall
- High shade tolerance
- Spreads by stolons and short rhizomes
- Requires (good) soil moisture
- Prefers loam and clay soils
- Low fertility requirement
- Excellent heat tolerance
- Poor cold tolerance

Turfgrass varieties (Cont'd)

Scientific name: *Z. matrella*, *Z. japonica* and *Z. macrantha*

Common name: [Zoysia](#)

Availability: Yes, as turf; seeded var. 'Compadre'.

- Mow 20-50mm
- Growth up to 30cm tall



Turfgrass varieties (Cont'd)

Scientific name: *Stenotaphrum secundatum*

Common name: [Buffalograss](#)

Availability: Yes, as turf and seed in a few years*.



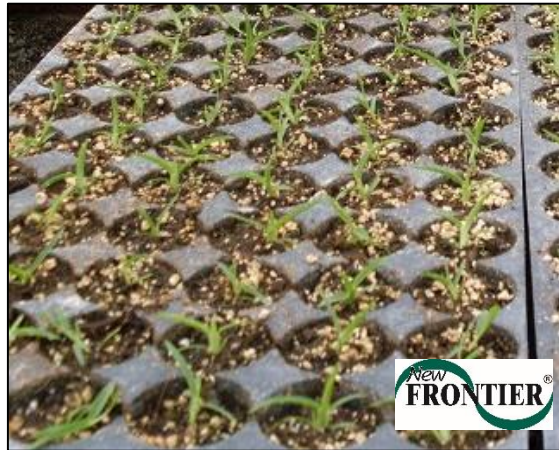
- Mow height 20-70mm
- Can grow to 10-30cm tall
- Handles mod to high shade
- Stoloniferous growth
- Some varieties have a dense root system
- Varied soil types
- Temperate, subtropical and tropical conditions

Turfgrass varieties (Cont'd)

Scientific name: *Stenotaphrum secundatum* (Cont'd)

Variety: [New Frontier®](#)

Soon to be sold as turf and seed.



Turfgrass varieties (Cont'd)

Scientific name: *Panicum laxum*

Common name: [ShadeGro](#)

Availability: Sometimes as seed.



- Mow height 30-50mm
- Can grow to 30-60cm tall
- High shade tolerance at 10-15% sunlight
- Does not like full sun
- Spreads by stolons
- Low fertility requirement
- Wide range of soil types
- Tolerates excessive moisture
- Good resistance to grubs
- Sow rate 2kg/100m²

Australia's Warm-Season Turfgrass Collection

- Maintained by ASTC since 2015
- Contains over 160 different warm-season turfgrasses
- The facility is located 30min drive south of Brisbane's CBD.

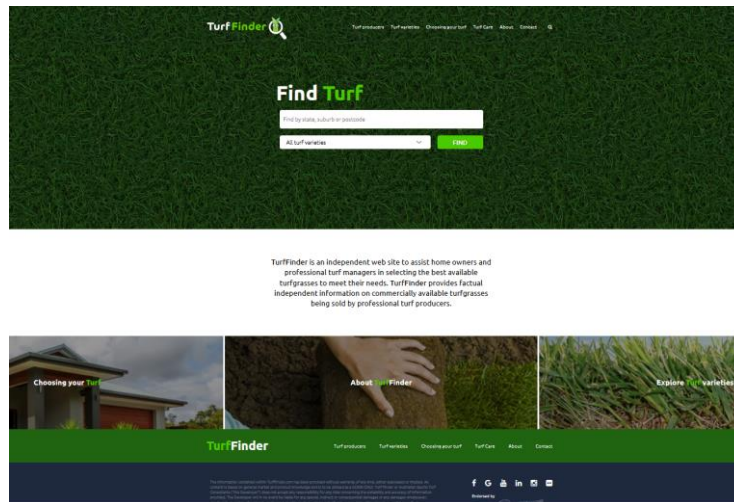


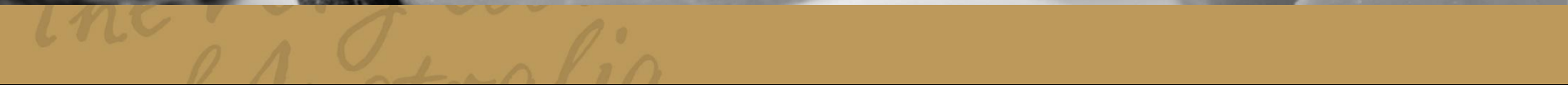
TURF FINDER

Assisting professionals & homeowners listing:

- 214 turf farms
- 87 (+19) turf varieties
- Maintenance advice
- 13 pest id's and control options
- 15 disease id's and control
- 50 weed id's and control options

www.TurfFinder.com





GRASS MANAGEMENT



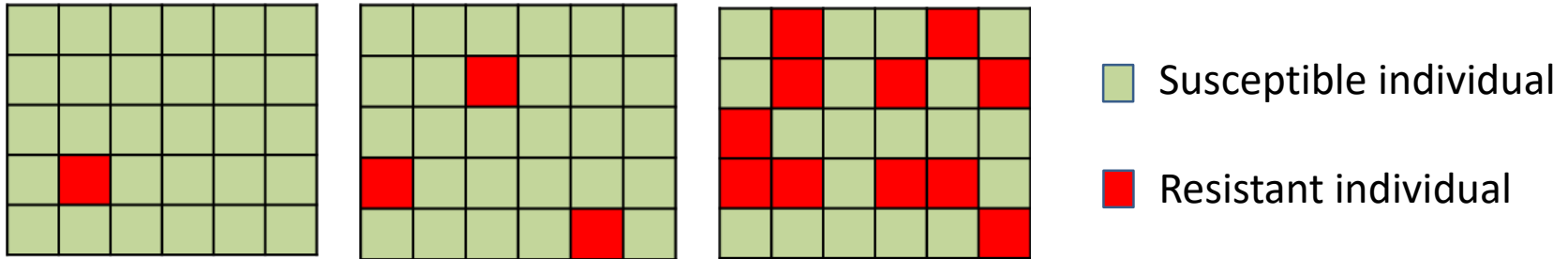
Grass Management - Herbicides

- Knowing your orchard
- Optimum control varies with orchard conditions and your environment
- IPM
- Follow label instructions (especially restraints e.g. sensitive crops) and directions by the APVMA.
- Proper use of effective herbicides
 - Chemical rotation
 - Rain and wind conditions
 - Reduce weeds and mowing requirements
 - Reduction of injury to trees

Grass Management – Herbicides (Cont'd)

- Chemical rotation:

“Resistance is a term used to describe a change in the genetic composition of an insect [or weed] population that results from exposure to an insecticide over a period of time” – C.A. Silcox (1992).



Why is it a problem?

- Over reliance on a few products.
- Loss of products through registration/ government controls.
- Lack of new products with novel modes of action

Grass Management – Herbicides (Cont'd)

- Chemical rotation (Cont'd):

Crop Science Australia

Find crop solutions Your crops Tools News & Insights About us Current offers Search

Select a Mode of Action Group Letter to learn more

A B C **Group D** F G H I J K L M N O Q R Z

Group D#: Inhibitors Of Microtubule Assembly

Chemical Family

- Dinitroanilines (e.g. trifluralin)
- Benzoic acid
- Benzamides (e.g. propyzamide)
- Pyridines

Mode of Action

- Inhibit microtubulin synthesis (cell division) necessary in the formation of cell walls, which stops normal root growth

Symptoms

- Dehydration of the plant as the normal function and size of the root system has been severely restricted
- The weeds which emerge have stubby and pruned roots and the leaves turn purple
- Grasses may have short and swollen coleoptiles while broadleaf weeds may have swollen hypocotyls

Resistance Mechanism

- Non-target site
- Thought to be associated with the hyperstabilization of microtubules rendering them immune to dinitroaniline inhibition

Confirmed Group D Resistant Weeds in Australia*

Grass Weeds	Broadleaf Weeds
Annual ryegrass	Dense-flowered fumitory
Winter grass	

<https://www.crop.bayer.com.au/tools/mix-it-up/herbicide-groups>

Grass Management – Herbicides (Cont'd)

- Research is warranted on the use of effective selective herbicides, that are designed for turf and grass control, within the mac industry.
- Pre-emergence products used in turfgrass* for further investigation given their scheduling and herbicide grouping. **For discussion only**

Group D	Group K	Group G	Group O
Barricade (unscheduled)	PENNMAG (S5)	Ronstar (S6)	Specticle (S6)
Dimension (S5)			
Pendimethalin (S5)			

***Disclaimer: Products are to be applied as per label instructions ONLY**

Grass Management – Herbicides (Cont'd)

The Syngenta logo is displayed in white text on a green rectangular background.

Barricade (Prodiamine) used within the turfgrass* industry. **For discussion only:**

- Labeled for a range of Grass weeds & Broadleaf weeds in Australia
- Excellent safety to established plants (highly soil bound, low solubility, low leaching potential)
- Single application can provide 6 month control – Season long
- Unscheduled poison – minimal PPE and re-entry when dry.

***Disclaimer: Products are to be applied as per label instructions ONLY**

Grass Management – Herbicides (Cont'd)

- Post-emergence products -
 - Further research is warranted on the use of effective selective herbicides, that are designed for turf and grass control, within the mac industry.
 - New testing would also be required as part of the The National Residue Survey (NRS) for different products.



Giant Parramatta Grass



Wiregrass



Giant Rat's Tail Grass

Disclaimer: Products are to be applied as per label instructions ONLY

Grass Management – Herbicides (Cont'd)

- Some essential equipment required for product application dependent on the target and treatment:



Disclaimer: Products are to be applied as per label instructions ONLY

Grass Management – Plant Growth Regulators

International Turfgrass Society Research Journal
Volume 12, 2013

USE OF TRINEXAPAC-ETHYL TO REDUCE MOWING REQUIREMENTS OF WARM-SEASON GRASSES IN SUBTROPICAL AUSTRALIA

Matthew B. Roche*, Jonothan D. Penberthy and Lin O'Brien

- For DISCUSSION ONLY.
- Reduce cell elongation, labor & equipment costs.
Improve turf density and health
- Trials on 4 different turfgrass species
- Syngenta: 20-50% clipping reduction over 2-6 weeks
- The study found 15-29% mowing reduction.

Disclaimer: Products are to be applied as per label instructions ONLY



Grass Management – Plant Growth Regulators (Cont'd)

Primo 250EC on Broadleaf carpet grass [*Axonopus compressus*].

For discussion only

syngenta.

52% reduction in clipping yield



- 3 monthly application at 1 l/ha

syngenta.

77% reduction in clipping yield

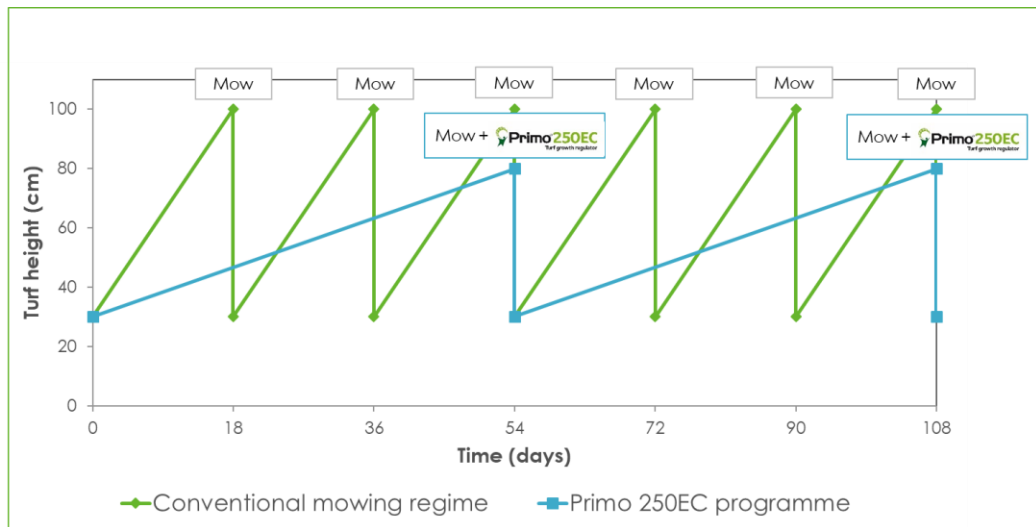


3 monthly application at 1.5 l/ha

Grass Management – Plant Growth Regulators (Cont'd)

Changi Airport – Largely broadleaf carpet grass [*Axonopus compressus*].

For discussion only



Maintenance program	Number of cuts	Number of sprays
Conventional	6	0
Primo 250EC	2	2

syngenta.

Grass Management – Plant Growth Regulators (Cont'd)

For discussion only

Primo 250EC current registered turf species

syngenta.

Grass species	Grass species
Carpet grass	Kikuyu
Zoysia	Ryegrass
Buffalo Grass	Bentgrass
Hybrid Couch	Fescue
Common Couch	Poa annua

Grass Management – Mowing and Scarifying

- Routine mowing e.g. 2-3 weeks
- Need to manage grass so that nuts do not sit within the turf sward/canopy



Amazone Profihopper

Mowing, aerating, cutting and collection in just one pass. Has 1.25m width, high lift tipping to 2.1m.

Grass Management – Mowing and Scarifying (Cont'd)



© Scamblers.com

Amazone Horsehopper

- Better suited size machine
- 1.5m or 1.8m cutting width
- Mounted onto small tractors
- Mowing, aerating, cutting and collection in just one pass
- Like the profihopper, it has the ability to collect fallen nuts (when not harvesting) to reduce rat issues

Grass Management – Scarifying or Dethatching



Verti-Cut 1300 - Redexim

Grass Management – Soil (Cont'd)

- Soil compaction



Grass Management – Soil (Cont'd)

- Soil nutrition – Not just the Macadamia tree, but also the grass.
- Promoting lateral growth and development particularly before and during harvesting e.g. Feb to Aug.
- Promoting the desirable turfgrasses to limit weed development and undesirable ground cover.

SOIL NUTRITIONAL TESTING

Client: BUNDABERG GOLF COURSE

Sample Date: 23 January 2019

Reporting Date: 31 January 2019

BUNDABERG GOLF CLUB

Analysis	Guideline	2 nd Green	18 th Green	17 th Green		Average
pH (1:5 H ₂ O)	6.0 - 7.0	7.1	7.1	6.7		7.0
Organic Matter %	1 - 3	1.9	1.8	1.7		1.8
CEC (meq/100g)	1 - 5 sand	4.29	4.12	3.38		3.9
EC (1:5 H ₂ O) (dS/m)	0.22 - 0.75	0.09	0.02	0.06		0.1
NOS-N (ppm)	10.0 - 25.0	10	9	8		9.0
Phosphorus (ppm) [Olsen]	7.0 - 14.0	16	18	23		19.0
Potassium [Am.Acet] (meq/100g)	0.2 - 0.5	0.29	0.26	0.23		0.3
Calcium [Am.Acet] (meq/100g)	5 - 10	2.93	2.76	2.19		2.6
Magnesium [Am.Acet] (meq/100g)	1.0 - 3.0	0.85	0.89	0.78		0.8
Sulphur [MCP] (ppm)	11.0 - 20.0	22	19	12		17.3
Boron [CaCl ₂] (ppm)	1.0 - 2.0	0.1	0.2	0.2		0.2
Copper [DTPA] (ppm)	0.3 - 5.0	1	1.4	1.1		1.2
Iron [DTPA] (ppm)	5 - 120	13	17	22		17.3
Manganese [DTPA] (ppm)	2.0 - 40.0	5.6	9.5	9.4		8.2
Zinc [DTPA] (ppm)	0.5 - 5.0	2.6	3.2	3.6		3.1
Sodium [Am.Acet] (meq/100g)	< 0.3	0.17	0.18	0.13		0.2
Aluminium [HCl] (meq/100g)	< 0.5	0.06	0.04	0.05		0.1
Chloride (ppm)	< 50	30	34	26		30.0
Carb base saturation (%)	65 - 85%	60.3	66.9	64.7		66.6
H base saturation (%)	2 - 7 %	6.7	6.3	6.8		6.6
Mg base saturation (%)	10 - 20%	19.8	21.7	23.1		21.5
K base saturation (%)	< 1%	3.9	4.3	3.9		4.0
Al base saturation (%)	< 0%	1.3	0.9	1.4		1.2
Ca : Mg Ratio	2 - 5	3.45	3.09	2.81		3.1
Exchangeable Sodium Percentage	< 0 %	4.01	4.40	3.92		4.1

Low Adequate High Very High

Recommendations based on the SLAN Method = Sufficient Level of Available Nutrients and the BCSR Method = Base Cation Saturation Method. Laboratory testing by Phosyn Analytical, Brisbane QLD. Source references Bruce & Rayment (1992), Dept of Ag Vic (2011), Lohd (2015), Leake & Haeghe (2014), MoFarlane (1999), Matson (1991), Rayment & Bruce (1984) and Raymont & Lyons (2011).

Reference #B093015A-C/AST-00249

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Low Adequate High Very High

Recommendations based on the SLAN Method = Sufficiency Level of Available Nutrients & not the BCSR Method = Base Cation Saturation Method. Laboratory testing by Phosyn Analytical, Burleigh QLD. Source references: Bruce & Rayment (1982), Dept of Ag VIC (2011), Loh (2015), Leake & Haeghe (2014), McFarlane (1999), Matson (1981), Rayment & Bruce (1984) and Raymont & Lyons (2011).

Reference #B09 B01 SA-C\AST CD249

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Grass Management – Handy tools



CONTACT US

Matt Roche
Director & Principal Turf Consultant
Australian Sports Turf Consultants

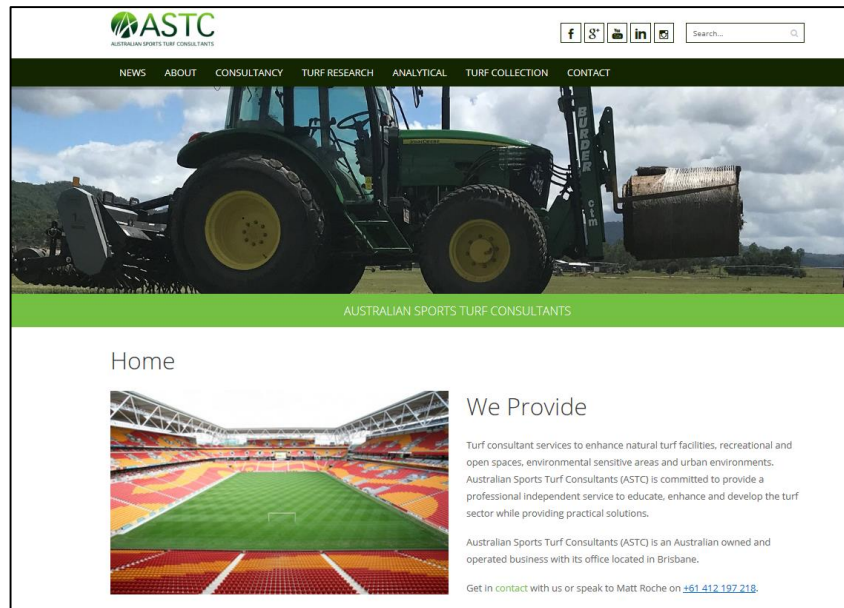
2/60 Gardens Drive, Willawong Q 4110

E: matt.roche@ASTCs.com.au

M: +61 412 197 218

W: www.ASTCs.com.au

W: www.TurfFinder.com





This event has been funded by Hort Innovation using the macadamia industry levy and funds from the Australian Government.

Our Partners



Rabobank



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Super**





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Thank you