

Sustainable Turf Breeding

in Australia and New Zealand







Experts from earth to turf

PGG Wrightson Turf

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What is sustainable turf breeding and why is it important?

Sustainable turf breeding focuses on developing grass varieties that thrive in a wide range of environments while minimising the need for key inputs such as water, fertilisers, and pesticides. During the breeding and assessment stages of product development the key measurables include turf quality (fineness and uniformity), colour, seasonal growth patterns, root depth and biomass, pest and disease resistance, drought resistance and endophyte level.

All of these factors combine to form a picture of the local adaptability of each turf species and cultivar. Understanding and quantifying these characteristics is vital to ensure long-term sustainability and reduced environmental impact of our turfgrass products.

2

What does the turfgrass breeding and selection process look like?

The process begins with sourcing highly adapted parent plants, that exhibit specific qualities. During the R&D phase, our plant breeders will observe key attributes of each plant and select for a range of preferred characteristics. These typically include uniformity, density, growth (seasonal and lateral), colour, drought tolerance, leaf fineness, seed yield and disease resistance.

Over the next several years our plant breeders will further select plants that exhibit the strongest preferred characteristics. These selections will then move forward to dedicated turfgrass trials for observations regarding their performance under 'real world' management. During this time our growers will begin the multiplication process with the aim to produce seed stock for large scale production and ultimately, commercialisation.

3

An overview of the turfgrass cultivar production and development lifecycle

The development lifecycle spans several years:

Years 1-2 — *Initial plant crossings*

Years 3-4 — *Further refinement of traits through additional crossings and selection*

Years 5-8 — *Trialling, performance assessments, and commercial viability checks*

Years 7-9 — *Large-scale seed multiplication*

Years 9-10 — *Product registration and certification*

Years 10+ — *Ongoing production and market release*

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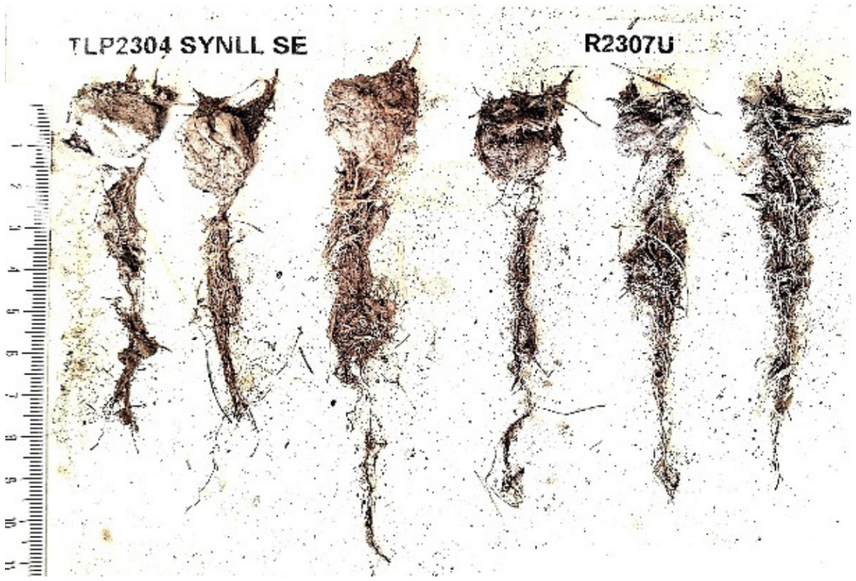
Screening for sustainable solutions

In line with recognised international screening protocols our turfgrass products are screened for their adaptability to a wide range of biotic and abiotic stressors.

Key to this screening process are metrics such as root depth and biomass. These characteristics are demonstrated through both in field measurements and controlled laboratory settings.

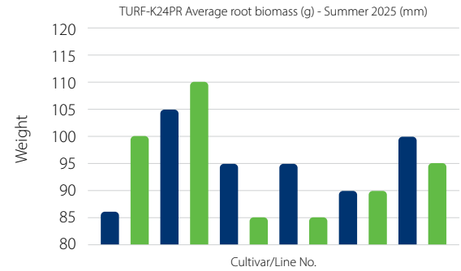
Our agronomists employ methods such as Normalized Difference Vegetation Index (NDVI), Rhizobox demonstrations, root biomass measurement using AI and Digital Image Analysis (DIA) to ensure our data remains objective and consistent with global screening protocols. We also invest into drought tolerance screening protocols and salt tolerance.

Figure 1



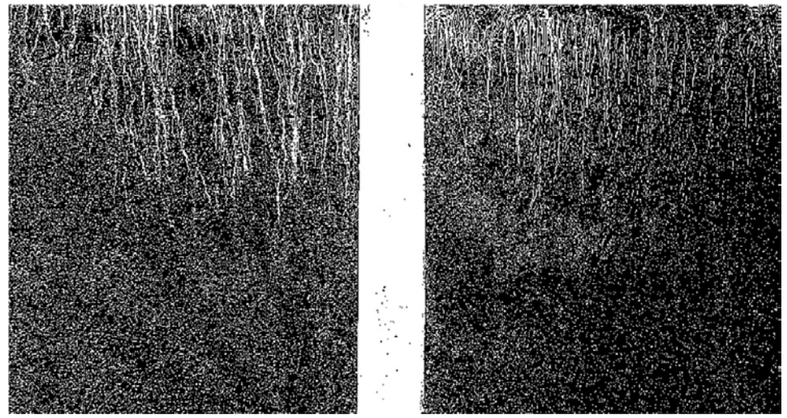
Representative root depth measurements of all turfgrass varieties are collected.

Figure 2



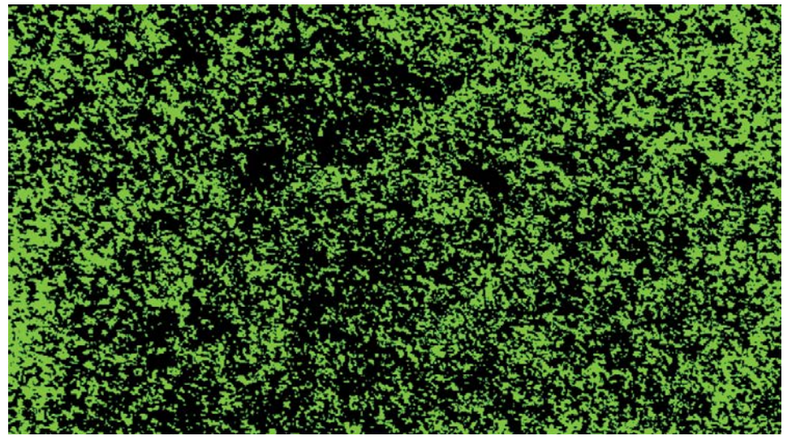
Graphed example of the seasonal data relating to the root biomass (weight of root material) for each turfgrass variety.

Figure 3



Monochrome root depth study of turfgrass displayed within a Rhizobox.

Figure 4



DIA image of a turf surface to calculate factors such as: *Poa annua* ingression, & density, colour, uniformity etc.

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An overview of PGG Wrightson Turf Mi-LAB services

Our Mi-LAB services aim to expand the R&D capabilities of our Kimihia Research Facility by delivering science-based, analytical agronomic services that provide customers with objective, data-driven insights.

Soil & Water Nutrient Testing

- Collect and process water samples for independent analysis
- Provide a bespoke interpretation of laboratory analysis

Material Analysis

- Laboratory analysis of materials associated with the construction and/or management of all natural turf systems
- Provision of a report and recommendations based on analysis

Organic Matter (%) Analysis

- Samples can be either collected or submitted to Mi-LAB
- OM% is measured via the Loss on Ignition methodology
- Data trends can be reported on and tracked as appropriate

Pest & Disease Analysis

- Provision of a qualified plant pathology service
- Provision of a detailed report on findings with clear recommendations for advised actions
- Add the following to Pest and Disease analysis: Provision of DNA pathogen analysis where required.

Nutrient Results

- Provision of site-specific (species and soil type) interpretations of independent laboratory analysis
- To optimise the sustainability of our recommendations, all soil and plant nutrient deficits are calculated against established tolerances for plant and soil nutrient sufficiency, specific to NZ soils, species, and climate

Commissioned Trial Work

- Utilising resources at our Kimihia Turf Research Facility we can offer private commissioned trial services upon request
- We can design protocols and trials for clients, or adhere to predetermined protocols (as appropriate)

Species Sward Composition

- Visit site and capture images relating to existing turfgrass species composition (using a Lightbox)
- Analyse the images using Digital Image Analysis (DIA)
- Provide client with report and track species composition trends over time. This service can be offered remotely

Sports Surface Benchmarking

- On-site visit to carry out benchmarking (measurements) of key surface performance factors
- Benchmarking includes (but not limited to): Surface firmness, OM%, soil/plant nutrients, soil microbial analysis, surface infiltration, surface shear strength, profile compaction, turf quality assessment, sward density, NDVI
- Provision of a detailed report and tracking of key data trends

Soil Microbiological Analysis

- Provision of scientifically based testing services that quantify the active soil biology (fungi and bacteria) within the soil
- Provision of a bespoke report that provides clear recommendations on how to enhance soil microbiology

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Our commitment to the Australasian turfgrass sector

PGG Wrightson Turf commits to providing:

Certified turfgrass species and cultivars for use across all sporting turf surfaces that are best adapted to the local climatic and soil conditions of the Australasian region. All cultivars/components of our blends are first-generation certified and carry an individual seed test certification to the following minimum requirements: Purity 98 % +; Germination 90 % + & 70 % + viable Endophyte* (test date no older than twelve (12) months).

**Where applicable/desired*

All varieties offered by PGG Wrightson Turf are trialled, tested and proven in New Zealand and Australia

Our trialling includes proven success in:

- Disease resistance
- Pest resistance and endophyte level
- Wear resistance
- Drought stress
- Cool temperature germination and winter activity

You can follow our sustainability journey through either speaking with your regional Territory Manager or following us on any of our social media channels.

facebook.com/pggwrightsonturf *instagram.com/pggwrightsonturf*

Disclaimer: PGG Wrightson Turf is a trading division of PGG Wrightson Seeds Ltd (*PGW Seeds*). PGW Seeds provides no assurance, guarantee, representation or warranty in relation to any advice, information, service, seed or turf produced from the seed, endophyte, product or treatment (together *Material*) other than those that must be provided by law. To the extent permitted by law PGW Seeds excludes or limits liability (including for indirect and consequential loss) on any basis (including in negligence and under any enactment) from or in relation to the Material or its use and any remaining liability shall not exceed twice the amount received by it in relation to the Material.

Mi-LAB

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Our clients include:

TARA ITI
TE ARAI, NEW ZEALAND

EDEN PARK
NEW ZEALAND'S NATIONAL STADIUM

MCG

FORSYTH BARR STADIUM

SUNCORP STADIUM

TE ARAI LINKS

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