Guideline: Turf grass

About Smart Approved WaterMark

Since 2004, SAWM has certified water efficient products and services. As a national scheme it delivers a common national approach and labelling scheme for consumers and retailers. For consumers, the certification scheme is designed to provide confidence that products and services bearing the label will help them save water around the home and garden. For the water industry, the scheme provides a national mechanism to identify water saving products and services; one piece of the demand management jigsaw. Certificate holders – licensees - gain the ability to use the Smart Approved WaterMark for marketing advantage.

Certification applications

Applications to the Smart WaterMark are assessed by an independent technical expert panel against the following four criteria:

1. **Water saving.** The primary purpose of the product is to reduce water use or to use less water than similar products which have the same purpose.
2. **Fitness for purpose.** Supporting documentation (such as instructions and marketing material) helps ensure that users get the best water savings/efficiency from the product.
3. **Meeting regulations and standards.** The product is of high quality and meets industry standards, and customer and community expectations.
4. **Environmentally sustainable.** The product, while satisfying the above three criteria, is environmentally sustainable and does not adversely impact the environment in making water savings.

Introduction to turf grass guidelines

These guidelines have been developed following extensive consultation with the Australian turf industry and input from panel of independent turf professionals.

The selection of appropriate turf varieties for the home garden will help to conserve water as well as provide important amenity values. Measuring water use in plants accurately and in a range of environments is a complex challenge. SAWM has worked with the turf industry to identify turf grass varieties that display drought tolerance, rather than try to evaluate the water use characteristics of turf grasses. This decision is based on the concept that awarding the Mark to turf grass varieties that display drought tolerance will help homeowners select grasses that can withstand periods of little or no water application. SAWM recognizes that drought tolerance is only one of many factors that a homeowner might use to choose a turfgrass for a garden lawn.

To evaluate applications, the expert panel needs verifiable, independent evidence that the turf grass demonstrates the drought tolerance characteristics claimed in the application (i.e., through independent testing, case studies or comparative reports). Note that unsubstantiated marketing claims are not regarded as

evidence of water saving.

The drought tolerance of turf grass varieties is best assessed by conducting an experiment or growth trials. While the expert panel does not insist on a specific trial methodology to demonstrate drought tolerance, the following guidelines have been developed to guide applicants about the kind of trials that could generate the data to support an application.

Guideline for assessing turf grass

These guidelines only apply to turf grass marketed and labelled for commercial sale for use in home gardens. While some varieties of turf grass grown in home gardens are also used for more extensive areas such as parklands and sports fields, the focus of these guidelines is on turf grass for the home garden.

It is important to emphasise that these guidelines are written solely to help applicants prepare submissions to Smart Approved WaterMark. These guidelines are not intended to set out a method for appraising all the characteristics of a turf grass. The aim is to evaluate the drought tolerance of turf grass to assist home gardeners who wish to use drought tolerance as their key selection criterion.

All evidence submitted in support of an application to Smart Watermark certification must be prepared by an independent authority that has no financial interest in any turf varieties included in any trial.

The following information has been compiled to help applicants evaluate the drought tolerance of turf grass.

Assessing drought tolerance of turf grass: An experimental approach

Aim

To determine whether a particular turf grass variety is more drought tolerant compared with other turf grass varieties.

Experimental design principles

The aim of the trial is to measure the drought tolerance of a target turf variety compared with benchmark varieties. If all SAWM trials use the same benchmark varieties, a series of comparisons will be assembled which will give useful insights into the drought tolerance of a range of turf grasses.

The trial should have three phases:

1. Establishment phase where all turf in the trial is grown under good conditions to promote the growth of a quality sward on each plot in the trial.
2. A water stress phase when all plots are subjected to a water stress and periodic measurements are taken of the turf in each plot.
3. A recovery phase after water stress to evaluate the recovery of the turf varieties in the trial.

Trial conditions

Measurements

Turf plots should be measured using objective techniques. For example, using quantitative techniques such as dark green colour index (DGCI), normalised vegetation index (NDVI) or “Canopeo” measurements. Other digital imagery analytical techniques or canopy spectral reflectance techniques can be used. Measurements should be taken every seven days, if possible.
The soil moisture status of each plot should be measured with any recognised device such as a TDR, capacitance probe or tensiometer. The method used must be detailed in the trial report.

The growing degree days for the water stress period should be calculated for the period of water stress using the equation:

$$GDD = \left[\frac{Max\ temp + \min temp}{2}\right] - base\ temp$$

Where GDD equals growing degree days

Maximum temperature is measured on site

Minimum temperature is measured on site

Base temperature equals 10 degrees centigrade for warm season grasses and 0 degrees for cool season grasses.

The soil characteristics of the plot area should be measured and include measurements of soil water holding capacity; bulk density; texture; and hydraulic conductivity. Measurements to be taken by a NATA registered laboratory.

Plot design

Trials should be conducted in plots of sandy loam soil. In all cases the growing media should as near as possible be identical for all replicates. Plots should have minimum dimensions of 3 x 3 m to avoid edge effects.
There should be a minimum of four replicates of each variety in each experimental treatment so that valid statistical analysis of the trial results can be made. Plots must be in a randomized complete block trial.
Agronomic treatment of all plots with respect to fertilisers and pesticides are to be identical in respect to products, application rates and timing. This information should be reported in the trial results.
The aim of the trials should be to establish a healthy growing plot before testing for drought tolerance.
All plots should be maintained using the same mowing height 20 mm for green couch, hybrid couch/ hybrid Bermuda grass and kikuyu and 30 mm for buffalo grass and zoysia and other species.

Water stress phase

The trial should begin with the soil at field capacity and the soil moisture should be measured continually throughout the trial, or at least every seven days when turf measurements are taken. During the water stress phase, plots can only be watered with irrigation equivalent to 40% of

pan evaporation as measured by a Class A pan or 40% Epan. If Epan equals 10 mm then 40% ePan equals 4 mm.

The water stress period should last for a minimum of 60 days. This period should occur at that time when turf grass is normally irrigated in the environment where the trial is being conducted. The starting months for the water stress periods are detailed in Table 1.

Location	**Starting month of water stress phase trial**
Adelaide	November
Alice Springs	May
Brisbane	June
Broome	June
Cairns	June
Canberra	November
Darwin	May
Hobart	November
Melbourne	November
Perth	October
Sydney	November
Townsville	June

Table 1 Starting month for water stress trial for various locations

This is based on the Bureau of Meteorology record of the rainfall for the major cities in Australia, which is detailed in figure 1.

LOCATION	JAN (mm)	FEB (mm)	MAR (mm)	APR (mm)	MAY (mm)	JUN (mm)	JUL (mm)	AUG (mm)	SEP (mm)	OCT (mm)	NOV (mm)	DEC (mm)	ANNUAL (mm)	
Adelaide	20	13	27	39	61	80	76	70	59	42	30	30	547	
Alice Springs	40	40	35	20	18	14	17	5	7	21	33	41	291	
Brisbane	115	144	108	104	109	65	46	41	33	81	98	136	1080	
Broome	191	201	110	28	16	15	10	2	1	1	10	76	658	
Cairns	379	448	378	215	89	41	31	29	35	48	112	178	1982	
Canberra	55	53	45	41	38	44	48	46	52	51	69	61	602	
Darwin	466	373	335	108	25	2	1	6	17	65	137	276	1812	
Hobart	44	36	39	43	36	43	47	61	59	56	48	56	569	
Melbourne	40	37	39	38	36	39	39	43	44	51	61	51	518	
Perth	17	13	21	37	89	127	147	122	87	39	23	12	734	
Sydney	79	118	88	119	106	100	73	74	62	64	85	74	1042	
Townsville	250	292	110	75	33	19	14	21	12	26	79	141	1072	

Figure 1 Rainfall statistics for major Australian cities

(http://www.bom.gov.au/climate/australia/cities/)

Irrigation water should be applied by a system with a measured distribution uniformity (DU) of at least 80%.
Irrigation water should be supplied no more frequently than every three days and be a measured application depth equivalent to 40% of Epan for the previous 7 day period. If total Epan for the 7-day period was 27 mm then water application should be as near as possible 10.8 mm.

Benchmark variety

The benchmark varieties for the turf trials are as follows:

1. Equatorial: Wintergreen (cynodont dactylon)
2. Tropical: Wintergreen (cynodont dactylon)
3. Subtropical: Wintergreen (cynodont dactylon))
4. Desert: Wintergreen (cynodont dactylon)
5. Grassland: Wintergreen (cynodont dactylon)
6. Temperate :Santa Ana, hybrid green couch(Cynodon dactylon x C. transvaalensis).

All turf grasses used in trials should be sourced from certified stock and the source of the stock should be detailed in the trial report.

Recovery phase

The water stress phase should be followed by a recovery phase, when all plots can be watered with sufficient water to promote plant growth. The recovery phase should have a minimum duration of 30 days.
The amount of water applied should be the same for all plots.
Turf plots should be measured in the same way, and at the same interval, as was used during the water stress phase.
Soil moisture status should also be recorded during this phase.
The recovery phase should continue until four additional measurements of all the plots have been made.

SAWM certification

Turf is grown throughout Australia in a variety of environments. For this guideline SAWM has used six major zones as defined by the Australian Bureau of Meteorology using the Koppen classification system which uses the range of native plants to define the zones. A map of the Koppen zones is shown in figure 2.

7. Equatorial

8. Tropical
9. Subtropical
10. Desert
11. Grassland
12. Temperate

Trials should be conducted in environments representative of all zones for the applicant to apply for a national SAWM license.

A turf grass may be certified if it demonstrates better scores for the parameters, measured during the trial, than the benchmark variety in the water stress trial. In general trial varieties should exhibit the same turf health as the benchmark species, using the same or less water.

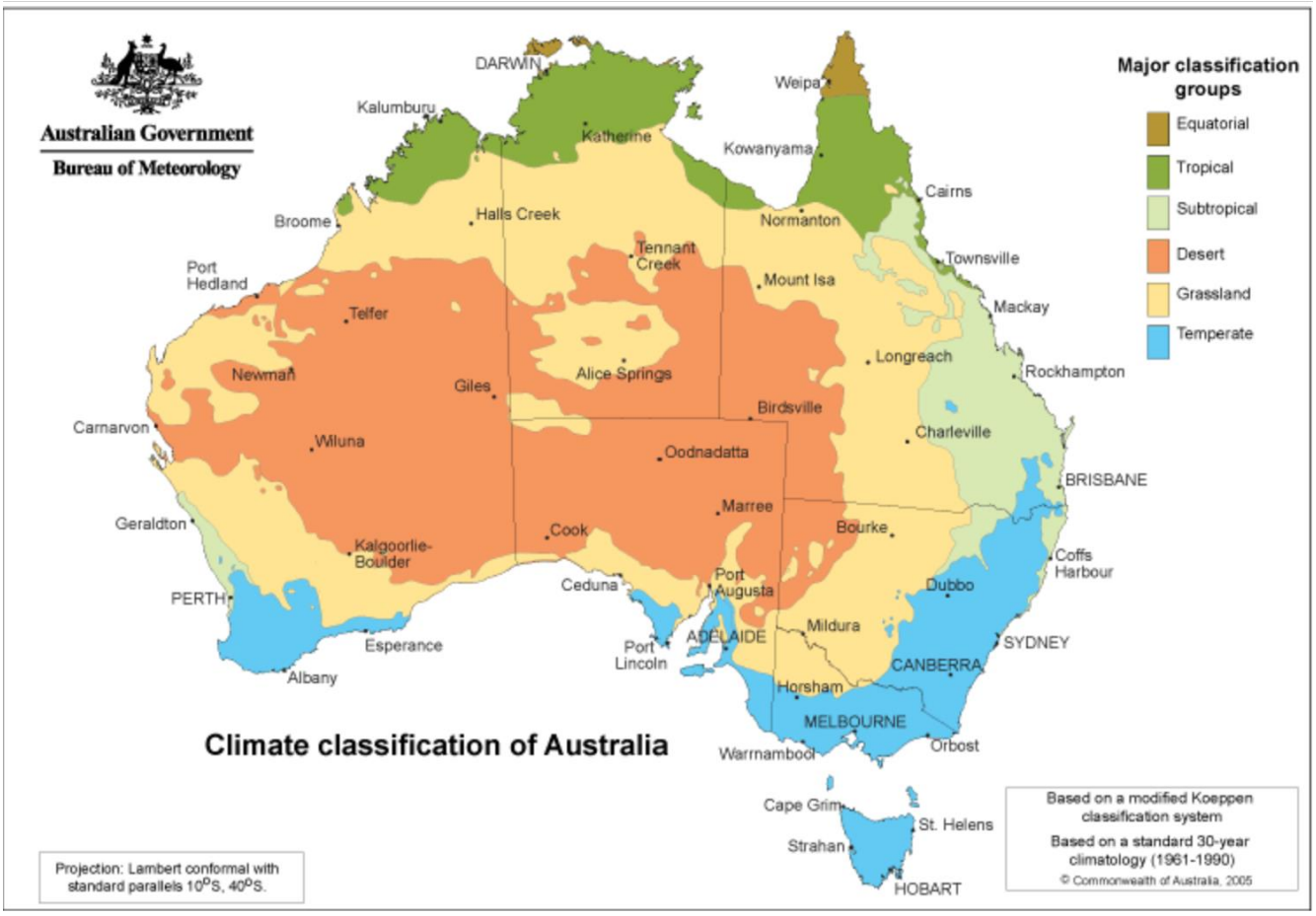

Figure 2 Map of Koppen Zones in Australia

(http://www.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jsp?maptype=kpngrp#maps

The Australian Bureau of Meteorology defines Koppen zones as follows:

> *"The Köppen classification maps show six major groups and 27 sub-groups of climate zones across Australia. These climate zones are defined with the climatic limits of native vegetation in mind. This method of classification is based on the concept that native vegetation is the best expression of climate in an area.*
>
> *The six major classes are identified predominantly on native vegetation type,*

with the additional sub-groups taking into consideration seasonal distribution of temperature and precipitation:

- *Equatorial*
- *Tropical*
- *Subtropical*
- *Desert*
- *Grassland*
- *Temperate”*