

Compost specifications for turf and sporting fields

Introduction

This document is one of a set of six specifications for the application of recycled organics in the following settings:

- 1. Horticulture**
- 2. Sporting fields and turf production**
- 3. Compost blankets for erosion control**
- 4. Biofilter establishment**
- 5. Pastures**
- 6. Landscaping.**

These specifications have incorporated the NSW Resource Recovery Orders (RROs) and Resource Recovery Exemptions (RREs) for compost and pasteurised garden organics which specify legal requirements in NSW under which it is permitted to use these recycled organic wastes on land. The conditions and limits stipulated in these regulations have been included. Note that the resource recovery orders and exemptions (RROs and RREs) only apply in NSW.

The basis of these specifications is Australian Standard AS 4454-2012 Composts, soil conditioners and mulches. This standard specifies the general physical and chemical characteristics of composted products that should be used as a minimum basis for selecting products. These specifications use AS4454 as the basis and recommend additional criteria where it is directly relevant to optimising performance.

These specifications provide guidance on the characteristics of composted recycled organics, and include information on:

- general characteristics and minimum acceptable contamination levels, for the six mentioned applications
- performance characteristics
- appropriate use and application recommendations.

These do not include specifications or details for other recycled organics products such as uncomposted manures, composts made with biosolids or solid or liquid food wastes.*

General specifications

Many of the criteria listed in AS4454 are relevant to composts for sporting fields and turf applications, as they specify the basic suitability of compost for land application. These characteristics apply equally to sporting fields and turf applications.

The general product specifications for composts to be used in sporting fields and turf applications are presented in Table 1.

* Composts made with biosolids are managed under the Biosolids Order and have particular conditions that may not be suitable for use under the scope of these brochures.

Table 1 General product characteristics for compost used for sports fields and turf applications (Source: AS4454)

Characteristic	Unit	Target / typical range	Advice
pH <small>(1:5 water)</small>	pH units	Range 5.5 – 8.0	If >8.0 determine total CaCO ₃ content
Electrical Conductivity (EC)	dS/m	< 6	High EC may limit application rates
Organic Carbon	% dry matter	15 - 25	Generally higher organic carbon is preferable for composts of equivalent maturity
Carbon: Nitrogen Ratio	(C:N)	Typically 10:1 – 25:1	C:N is typically higher for mulches used in orchards, lower for composts incorporated into soil in vegetable production

Acceptable contamination levels

Composts used in sporting fields and turf should be as free as possible from all types of contamination. Compost not meeting the limits in Table 2 should be rejected due to possible environmental and human health risks. Most producers will supply a sample of their products if requested.

Table 2 Maximum acceptable level of contaminants for sporting field and turfing applications

Biological Contamination			
Plant Propagules	Unit	Recommendation	
Viable Plant Propagules	Number	Nil after 21 Days	
Vermicast Sieve Test	% Volume	Nil after 21 days for the fraction ≥ 90% passing the 1.18 mm sieve	
Microbial Contaminant	Unit	AS4454 Limit ¹	RRO Limit ²
E. coli	MPN/g	-	<100
Salmonella	cfu/g	Absent in 50g	Absent in 25g
Faecal Coliforms	MPN/g	<1,000	<1,000

1 As specified in Australian Standard AS4454-2012

2 NSW Compost Order 2016

Physical Contaminants			
Material	Unit	Top-dressing sporting fields ³	Top-dressing at turf farms ⁴
Glass, Metal and Rigid Plastic > 2mm	% dry matter (dm) (w/w)	<0.15%	<0.4%
Plastic - light, flexible or film > 5mm	% dm (w/w)	<0.015%	<0.02%
Stones and Lumps of Clay	% dm (w/w)		

Chemical Contaminants					
Heavy Metals	Unit	AS4454	Other Chemicals	Unit	AS4454
Arsenic	mg/kg	20	DDT/DDD/DDE	mg/kg	0.5
Cadmium	mg/kg	1	Aldrin	mg/kg	0.02
Boron	mg/kg	100	Dieldrin	mg/kg	0.02
Chromium	mg/kg	100	Chlordane	mg/kg	0.02
Copper	mg/kg	150	Heptachlor	mg/kg	0.02
Lead	mg/kg	100 ⁵	HCB	mg/kg	0.02
Mercury	mg/kg	1	Lindane	mg/kg	0.02
Nickel	mg/kg	60	BHC	mg/kg	0.02
Selenium	mg/kg	5	PCBs	mg/kg	0.2
Zinc	mg/kg	300			

Performance characteristics

Beyond the characteristics specified in the AS4454, the following performance characteristic differ slightly for each type of turf or sporting field application. These specifications differ depending on whether the compost is used as a top-dressing or incorporated into the soil. There is no specific performance characteristic difference between compost used for sporting fields or turf farms. These performance characteristics mainly focusses on the physical characteristics of the compost.

3 AgEnviro Sports Fields Spec 2017

4 From AgEnviro Solutions Sport fields Spec Report 2017

5 Note that this differs from AS4454 limit of 150mg/kg. Clause 43 of the Biosecurity Regulation 2017 sets 100mg/kg as the maximum allowed concentration for lead (Pb) in a fertiliser. Fertilisers include composts. Clause 44 of the Biosecurity Regulation 2017 also refers to label requirements on fertilisers that exceed 'trigger levels' for lead, cadmium and mercury of 20, 1 and 0.2mg/kg respectively. The label requirements advise that use of the product may result in the accumulation of those metals in the receiving soils. legislation.nsw.gov.au

Table 3 Recommended characteristics for composts designed for use in turfing applications

Characteristic	Unit	Typical range or desirable level	Advice for incorporation	Advice for use as top-dress
Particle size ⁶	mm		Has passed through an 8mm (square grid) screen	Has passed through an 14mm (square grid) screen
Stability and Maturity	NA	See Table 8	Pass 3 maturity tests	Pass 4 maturity tests

Compost maturity and stability

In applications to top-dressing turfs, it is particularly important that compost is properly composted and stable. Immature and unstable compost may continue to break down on top of the turf. Thus, only the most stable forms of compost, such as mature compost, should be used for top dressing. However, slightly less stable forms of compost, such as composted product, can be used when generally incorporated into the turf soil.

Table 4 below shows how AS4454 differentiates between composted and mature compost products using various technical measures of compost maturity:

- composted product must meet three of the criteria with at least one from Group A (Biological Activity) and one from Group B (Plant Growth)
- mature composts must meet four of the criteria with at least two from Group A (Biological Activity) and two from Group B (Plant Growth).

Only mature compost should be used for top-dressing turf.

Mature compost and/or composted product can be used when incorporated into the soil.

⁶ From AgEnviro Solutions Sport fields Spec Report 2017

Table 4 Maturity criteria for composts

Parameter		Composted product	Mature compost
Group A - Biological Stability		Pass at least 1 out of 3	Pass at least 2 out of 4
Solvita® Maturity Index		≥ 5 or 6	≥ 7 or 8
Nitrogen Drawdown Index (NDI)		>0.2	> 0.5
Specific oxygen uptake rate (mg O ₂ /g BVS/hr) at 30°C		< 3	≤ 1
Carbon dioxide respiration (mg CO ₂ /g BVS/day) at 30°C		≤ 12	≤ 8
Dewar self-heating (°C)		≤ 20°C	≤ 10°C
Group B - Plant Growth Tests		Pass at least 1 out of 3	Pass at least 2 out of 4
Ammonium N (mg/kg)		< 200	< 100
Plant growth test (Bioassay)	Root length (mm)	> 60mm	N/A
	In-vitro germination and root elongation (% of control)	> 80%	> 90%
	Seedling emergence (% of control)	Emergence >80%, Vigour >85%	Emergence > 90%, Vigour > 95%
Ammonium to Nitrate ratio		< 3.0	< 0.5
Volatile Fatty Acids (moles/g dry mass)		< 1,000	< 200
NH ₃ volatile ammonia (gas) (ppm/4-hour test)		< 800 (≥ Solvita® 4)	< 100 (≥ Solvita® 5)

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Disclaimer

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Glossary

Terminology	Definition
AS 4454	Australian Standard 4454-2012: <i>Composts, soil conditioners and mulches</i>
EC	Electrical conductivity
NSW EPA	New South Wales Environment Protection Authority
RO	Recycled organics
RRE	Resource recovery exemption
RRO	Resource recovery order

NSW Environment Protection Authority

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