

Information Sheet No. 3-9

Manufacturing Quality Products from Compost

Introduction to Australian Standard AS 3743 (2003) for potting mixes

Information Sheet No. 3-9
Fourth Edition 2012

Inside This Sheet

1 What is the Australian Standard AS 3743 (2003)?

Benefits from using compost in potting mixes

2 Two potting mix quality categories

Definitions

Risk management in AS 3743 (2003)

3 What range of potting mixes are included in AS 3743 (2003)?

Overview of potting mix quality guidelines

Testing for AS 3743 product attributes

4 physical, chemical and biological attributes for potting mixes

Important references

© Recycled Organics Unit
First edition 2001
Fourth Edition 2012

ISBN 1-876850-02-7

What is the Australian Standard AS3743 (2003)?

The Australian Standard AS 3743 (2003) contains guidelines to assist the recycled organics industry to produce quality *potting mixes*.

The overall objective of the standard is to provide manufacturers, educational institutions, consumers and growers with a set of minimum requirements which will ensure that potting mixes can germinate seeds, grow seedlings, strike cuttings and maintain plant growth.

The standard specifies physical, chemical, biological and labelling requirements for potting mixes packaged for resale.

Potting mixes of both regular and premium quality are covered.

Requirements are also included for specialist potting mixes labelled as suitable for African violets, bulbs, hanging baskets, seedlings, orchids, acid-loving plants and plants that are

sensitive to phosphorus.

Given the beneficial effect that composts impart to potting mixes, formulation of composts into potting mixes can be a potentially profitable method of value adding to composted organics.

Benefits from using compost in potting mixes

The increasing price of peat in many countries in the late 1980's resulted in the widespread use of recycled organic materials as a substitute for peat in potting mixes.

Composts are an effective substitute for peat because the organic fraction:

- absorbs and releases water;
- slowly releases nutrients;
- assists in nutrient retention; and
- suppresses the growth of plant pathogens (Hoitink & Fahy, 1986; Handreck & Black, 1999).

Plate 1. A regular potting mix certified under AS 3743 (2003) for potting mixes. The mix contains composted garden organics, peat, sand and a wetting agent.



Potting mixes formulated with compost are often combined with inert material(s) to improve structural stability and *air-filled porosity*.

These may include: coarse sand; gravel; perlite; vermiculite; plastic foams; clay pellets; rockwool; scoria; pumice; diatomite and lignite (Handreck and Black, 1999).

Composts added to potting mixes usually have a specific particle size range to ensure that the mix has an adequate level of air-filled porosity.

Composts used in potting mixes also tend to be mature, thus minimising nitrogen drawdown and subsidence (or compression) in the pot.

Use of mature compost in potting mixes in many cases is important as immature composts can be toxic to plants.

AS 3743 (2003) provides a quality guideline for potting mixes, whether they are formulated with compost, peat or any other suitable type of material.

Two potting mix quality categories

One way a manufacturer can guarantee the quality of a potting mix is to have it certified according to criteria set out in AS 3743 (2003). Australian Standard Certification then allows the manufacturer of a potting mix to label their product with the widely recognised Australian Standard 'five ticks' logo.

Australian Standard Certification 'ticks' allows the differentiation of products in the market place. Consumers will buy a certified product with confidence, knowing that it is of a certain minimum quality.

To produce a potting mix that meets the Australian Standard, a manufacturer must use a quality management system based on best practice principles.

AS 3743 (2003) contains two product quality categories: *regular potting mix* and *premium potting mix*.

Premium potting mixes differ from regular potting mixes based on some chemical and physical properties.

Premium potting mixes have a higher soluble nitrogen content and thus a lower ability to deprive plants of soluble nitrogen. Such mixes can sustain plant growth for at least a month without added fertilisers if the use of the mix is commenced with 2 months of manufacture. Regular potting mixes require the addition of a balanced fertiliser from the time of potting.

In addition, the water holding capacity and wettability of premium potting mixes is superior to that of regular grade potting mixes.

Risk management in AS 3743 (2003)

Different raw materials that are used as ingredients in potting mixes can contain risk of physical, chemical or biological (health) hazards.

The standard addresses these risks via labelling to inform handling and hygiene requirements.

The standard also specifies in *Section 2.1 COMPOSITION* that potting mixes should be free from plant pathogens, pests, harmful chemicals and weeds.

These requirements can be achieved by specifying that organic materials

Definitions

Potting Mix

A growing medium suitable for the establishment and development of a wide range of plants in containers.

Air-filled Porosity

The percentage of air, by volume, in a potting mix after it has been watered and drained under standard conditions.

Regular Potting Mix

A potting mix with properties as outlined in AS 3743 (2003) and requiring the use of a balanced fertiliser from the time of potting.

Premium Potting Mix

A potting mix complying with the requirements as outlined in AS 3743 (2003). Most particularly, its soluble nitrogen content and low ability to deprive plants of soluble nitrogen enable it to sustain good plant growth for at least a month without added fertilisers if the use of the mix is commenced within 2 months of manufacture. Its nutrient levels, water holding capacity and wettability are superior to those of a regular grade mix.

in the potting mix must comply with the requirements for composted products specified in [AS4454 \(2012\) Composts, soil conditioners and mulches](#).

The 2012 revision of the AS4454 compost standard requires that AS4454 compliant compost products

- are effectively pasteurized to kill pathogens that present in manures and other materials; and to destroy plant propagules
- comply with government guidelines and are safe for "unrestricted use" in relation to risk of chemical contamination.

2.1 COMPOSITION

Potting mix shall not contain materials such as glass, or any sharp objects that could injure the hands of a user. It may, however, be composed of any other materials, provided that the requirements of Table 2.1, as appropriate, are met. The mix should also be free of plant pathogens, other pests, harmful chemical substances and any parts of plants generally considered to be weeds.

What range of potting mixes are included in AS 3743?

The standard specifies requirements for general and specialist potting mixes (see definitions). Some of the products within these categories are further divided into regular and premium grades.

The entire range of potting mix products covered in AS 3743 (2002) is shown in Figure 1 below.

AS 3743 (2003) details the specific chemical, biological and physical requirements of these products.

Testing for AS 3743 product attributes

To demonstrate compliance with the product attributes specified in the Standard, representative samples of product should be regularly tested before distribution; and periodically tested by an independent laboratory.

Overview of potting mix characteristics for quality

The standard states that potting mixes must meet a minimum level of quality.

Tests for product quality assess different physical, chemical and biological properties of a mix that are relevant to plant growth. These attributes are explained in Table 1 (next page).

Figure 1. Shows the range of potting mixes covered by AS 3743 (2003). Readers should consult the standard for the specific chemical, biological and physical characteristics and differences between these products.

General Potting Mix		Specialist Potting Mix							
Grade	Regular	Premium	Seedling	Orchid	Low Phosphorus	Acid	African Violet	Bulb	Hanging Basket
Regular	✓	✓	✓	✓	✓	✓	✓	✓	✓
Premium					✓	✓	✓	✓	✓



Recycled Organics Unit - resources and services

The ROU website provides free access information resources that are used around the world for the safe recovery and management of biodegradable organic materials, and the manufacture and beneficial use of recycled organics products. The ROU also offers direct services for government and commercial projects.

Need assistance to establish a facility? To improve compost production capabilities and quality?

ROU has over 20 years direct experience design, development and operation of food/garden/manure organics collection and processing systems, including operator training, procedures and quality manuals.

Are you carbon price ready? Are you clear on your greenhouse risk & opportunity?

ROU has over 10 years experience in corporate greenhouse accounting and management, and in carbon credit offset projects in Australia and internationally via the Kyoto *Clean Development Mechanism*.

To discuss your needs, online contacts at www.recycledorganics.com or email rou@recycledorganics.com

- Operator training and operating procedures
- Compost facility design and arrangement
- Production and QA systems: manuals, training, and associated services for certification
- Independent verification of standards compliance
- Development of compost recipe formulations, products and specifications for target markets

- Performance assessment of processing technologies (large scale and on-site)
- Corporate sustainability strategy
- Practical action plans for resource recovery including food waste and compliance solutions
- Greenhouse impact assessment and emissions management (CDM and CFI offset projects)

Table 1. Explanations of the physical, chemical and biological attributes for potting mixes as specified in AS 3743 (2003).

Soil property	Explanation
Physical properties	
Air-filled porosity	This is the percentage of air (by volume) in a potting mix after it has been watered and drained. Air filled porosity is important as this affects the ability of gases to diffuse in and out of a potting mix, which is required for good plant growth. Composts need to be combined with an inert substrate to maintain air-filled porosity over the life of the mix.
Total water holding capacity	This is the total amount of water (by weight) that a potting mix can hold after it has been watered and drained. Adequate water holding capacity is needed to provide water for plant consumption over time between waterings.
Wettability	This is the ease with which a potting mix may be re-wet once it has dried out. Some materials in potting mixes repel water when dry, and are difficult to rewet. This can seriously affect the ability of a mix to support plant growth. Wettability is measured as the time (minutes) taken for water to fully soak into a mix in the dry state.
Chemical properties	
pH	This is a measure of the acidity or alkalinity of a potting mix. pH can affect the availability of nutrients in potting mixes, and plants vary in their tolerance to pH.
Electrical conductivity	This is a measure of how salty a potting mix is. Potting mixes that have a high electrical conductivity can slow the growth or kill plants by causing water stress.
Ammonium, nitrate and chloride	Ammonium and nitrate ions, referred to as soluble nitrogen, are required for plant growth. Potting mixes low in these nutrients require the addition of fertiliser to ensure that good plant growth is achieved. High ammonium concentrations, however, can be toxic to some plants. The concentration of chloride is important as this ion contributes to the salinity of a mix. Young plants are particularly sensitive to water stress caused by high concentrations of chloride.
Nitrogen drawdown index	Potting mixes composed of organic materials that are not fully mature immobilise soluble nitrogen and can result in nitrogen deficiencies in plants. The nitrogen drawdown index measures nitrogen immobilisation in potting mixes.
P, K, S, Ca, Mg, Ca/Mg, K/Mg, Na, Fe, Cu, Zn, Mg & B	A range of macro- and micro-elements are required for sustained plant growth in potting mixes. The standard provides nutrient concentration ranges that are needed to produce potting mixes that are nutrient balanced.
Biological properties	
Plant growth bioassay (toxicity index)	This is a plant growth bioassay used as a screening test to ensure there are no problematic levels of organic and inorganic phytotoxins in soils could inhibit plant growth. Such phytotoxic compounds can be present in organic materials that have not been composted, or not adequately composted.

Important references

- Handreck, K.A. and N.D. Black (1999). *Growing Media for Ornamental Plants and Turf*. University of New South Wales Press, Sydney, Australia.
- Hoitink, H. A. J. and P.C. Fahy (1986). Basis for the control of soilborne plant pathogens with composts. *Annual Review of Phytopathology*, 24: 93-114.
- Standards Australia (2012). [AS 4454—Composts, soil conditioners and mulches](#). 4th edn. Standards Australia, Sydney, NSW
- Standards Australia (2003). [AS 3743—Potting mixes](#). Standards Australia; Sydney, NSW.

Acknowledgement

The authors would like to extend a special thankyou to members of the peer review committee for critically evaluating this document: Annie Kavanagh and Dr Mark Jackson, NSW EPA; Dr Trevor Gibson, NSW Agriculture; Dr Kevin Wilkinson, Agriculture Victoria; Mr Darren Bragg, Resource NSW; Mr Garry Kimble, Quality Assurance Services; Dr Martin Line, University of Tasmania; Mr Chris Rochfort, EC Sustainable Environment Consultants and Dr Pam Pittaway, University of Southern Queensland.

First edition 2001, Fourth edition 2012 © Recycled Organics Unit

Produced by:

Recycled Organics Unit
PO Box 6267
The University of New South Wales
Sydney Australia 1466

Contact details are online:

ROU Angus Campbell
Internet www.recycledorganics.com

Whilst all care is taken in the preparation of this Information Sheet, the information provided is essentially general in nature and the Recycled Organics Unit disclaims all liability for any error, loss or other consequence which may arise from application of the information in any specific situation.