



Using compost safely

A guide for the use of recycled organics in horticulture

Compost is a mixture of recycled organic materials that have been processed by natural organisms, breaking down the original materials into a usable form. Compost has many benefits for soil. It can feed plants, stimulate beneficial microbes, improve soil structure and help the soil retain nutrients, water and warmth.

However, compost is also a potential source of microbial, chemical and physical contamination. Human pathogens in manure, heavy metals in sewage sludge and plastics left in green waste bins all have the potential to contaminate growing sites and fresh produce.

Growers may therefore be reluctant to use compost, in spite of its potential benefits, because of concerns about how it could affect the safety of the food they grow.

This guide describes how fresh produce growers can use compost without affecting their food safety assurance program.

My business is Freshcare certified – what products can I use?

There are many organic fertilisers and soil amendments that can be used without affecting Freshcare certification:

- Compost that has been pasteurised in accordance with the AS 4454-2012 Composts, soil conditioners and mulches (AS 4454), or an equivalent, verified time / temperature treatment, can be used without restrictions.
- If a composting treatment cannot be verified, the material must be managed as if it were untreated manure.
- If untreated manures are used, a minimum period must pass between application and harvest. In most cases 45 days is sufficient. However, a longer period of 90 days is required if soil contacts (or potentially contacts) the harvestable part, and the product may be eaten uncooked (Figure 1).
- Human effluent and biosolids must not be applied to horticultural production areas. N.B. Treated biosolids, present as a component in commercial composts, are acceptable.



Figure 1 - Decision tree for use of fertilisers and soil additives (from Freshcare FSQ4).

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Turning compost efficiently using a windrower (V Brunton)



What do we mean by 'recycled organics'?

Recycled organics are defined as any plant or animal material that has been collected through waste management systems and treated to make it usable. A wide range of materials may be used, either individually or within a mixture, including:

LEAST RISK

- Green waste from forestry, land clearing, garden prunings and clippings and tree pruning
- Crop residues
- Spent mushroom compost
- Reject fruit and vegetables
- Organic materials from manufacturing (eg grape or olive marc, brewery waste)
- Food waste, cooking oils and grease trap waste
- Manure and bedding from livestock, horses, pigs and poultry
- Waste materials from abattoirs
- Dead animals, unsuitable for consumption
- Sewage effluent and biosolids (sewage sludge)

MOST RISK

Government regulations affect movement and use of organic materials. For example, in NSW application of recycled organics is regulated through the Resource Recovery Orders and Exemptions. Check with your supplier or local authority for guidance.

Making compost that's safe

MICROBIAL CONTAMINANTS

For compost to be considered treated, the key minimum requirement is that the materials are thoroughly pasteurised. That is, the centre of the pile should reach $>55^{\circ}\text{C}$ for three consecutive days prior to each of three

turnings of the pile or windrow. If manures or higher risk materials are included, as they usually are, then the centre of the pile should reach $>55^{\circ}\text{C}$ for three consecutive days prior to each of five turnings (Figure 2).

Turning also ensures that the pile does not become anaerobic (lacking oxygen), as this can increase growth of some human pathogens.

At the end of the composting period the pile should achieve *E. coli* $<100\text{cfu/g}$ and *Salmonella* not detected in 25g. This is verified through testing.

Measuring changes in the temperature of the pile after turning can indicate the maturity of composted material:

- Immature product heats rapidly and continues to rise over time.
- Composted product will heat up, but then tend to decline.
- Mature composted product will heat slowly, if at all.

Shredding (to produce mulch), ageing, dehydration and anaerobic digestion do not provide the same heat treatment as composting. This means the raw materials cannot be considered pasteurised. Unless the feedstock can be proven as free from manures or other animal products, the same withholding periods should be observed as indicated in Figure 1.

PHYSICAL AND CHEMICAL CONTAMINANTS

Compost containing physical contaminants introduces a potential food safety risk to growing areas. Compost should not contain readily visible glass, plastic, metal or stones.

Compost must not exceed upper limits for chemical contaminants such as cadmium, lead, and many others as set out in detail in AS4454. Confirming heavy metal concentrations in a composted product is particularly important if soil levels are already high.

What else do I need to do?

If compost containing manure or food waste is applied within the exclusion period before harvest then evidence must be kept that it has been treated in accordance with an approved treatment process.

Table 1 - Evidence of compliance

The supplier has an approved, certified treatment process	<ul style="list-style-type: none"> Evidence of certification to AS4454 is kept.
The supplier has a documented, verified treatment process	<ul style="list-style-type: none"> Evidence of treatment process provided. Certificate of analysis supplied for each batch of product, verifying the treatment achieves <i>E. coli</i> <100cfu/g and <i>Salmonella</i> not detected in 25g.
The supplier does not have a documented, verified treatment process	<ul style="list-style-type: none"> Product is considered untreated for the purposes of Freshcare.
The materials have been treated on farm to a documented, verified process	<ul style="list-style-type: none"> Records kept detailing composition, treatment method, start and end dates, temperature readings, batch quantity and identification code and name of supervisor. Certificate of analysis supplied for each batch of product, verifying the treatment achieves <i>E. coli</i> <100cfu/g and <i>Salmonella</i> not detected in 25g.

All composts, soil additives and other recycled organics must be stored so as to minimise any potential contamination of water sources and growing areas.

Compost should not be applied when heavy rain or windy conditions are expected. This will help avoid contamination of neighbouring crops or watercourses.

Freshcare certification also requires that that records are kept of:

- Application date.
- Location and crop.
- Product used.
- Rate of application.
- Wind speed and direction.
- Method of application.
- Name of the person applying the material.

The bottom line

Many recycled organics products can be used without affecting Freshcare Certification.

- Compost can be used without restriction if it has been correctly treated to kill pathogenic microbes (compliant with AS4454).
- Products that have not been treated to kill pathogenic microbes can still be used, so long as either:
 - They do not contain any manures or other materials of animal origin OR
 - Withholding periods are observed between application and harvest.
- Contamination is of most concern if the crop is grown close to, or in contact with the soil, and may be eaten uncooked.
- Human effluent and untreated biosolids must not be applied to growing areas.

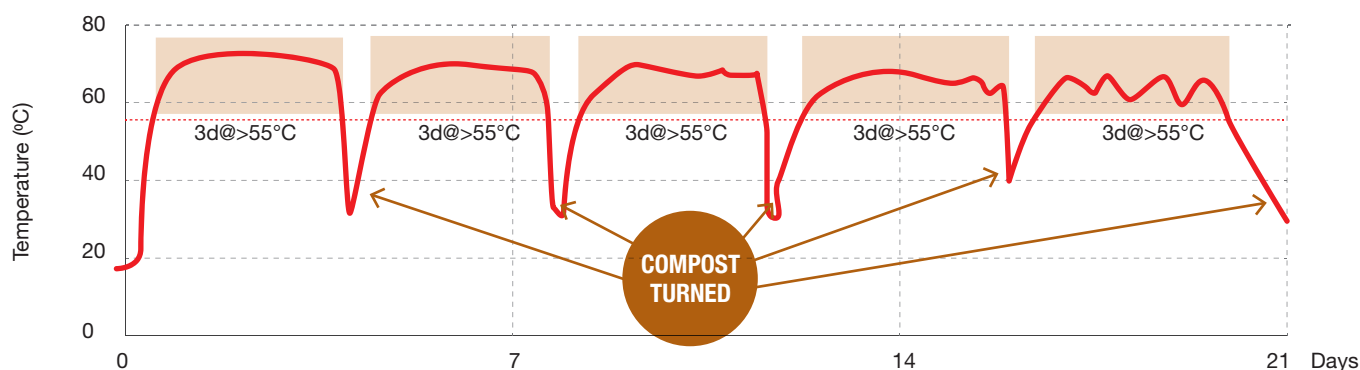


















Figure 2 - Temperatures inside a compost pile containing manure or higher risk materials. The core temperature needs to exceed 55°C for three consecutive days on five occasions, with the pile being turned after each heating event, for it to be considered properly composted in accordance with AS4454.

Recycled organic products

PRODUCT	WHAT IS IT?	USE UNDER FRESHCARE
Compost 	<p>A combination of pasteurisation, aerobic breakdown of organic materials and maturing are used to produce a mature, stable product. The purpose is to make a material that is safe to use, weed free and can be applied directly to horticultural land.</p>	
Raw mulch 	<p>Plant waste such as wood, bark and leaves are shredded to reduce size and homogenise the material. This makes it easier to apply. These products are usually applied to the surface and not incorporated into the soil.</p> <p>No manure or food waste is included.</p>	
Biochar 	<p>Biochar is made by heating organic materials to high temperatures (350-600°C) in a low oxygen environment (pyrolysis). Feedstock materials include forestry wastes, biosolids, manures and industrial wastes such as those from papermills. Biochar can be used as a concentrated soil amendment as the carbon remains stable in the soil, potentially for centuries.</p>	
Raw manure 	<p>Manure may be supplied directly from intensive poultry or livestock facilities. It can also be purchased as a processed product. Unless it can be verified that the material has been properly pasteurised, processed products must be treated as raw manure. As a potential source of microbial contamination, raw manure cannot be applied within 45/90 days of harvest.</p>	
Compost tea 	<p>Compost tea is usually made by steeping aged compost in water then filtering to remove solids. However, ingredients and techniques vary widely, and strongly affect the efficacy and safety of the end solution. If animal products are included, compost tea must be handled the same way as raw manure. Moreover, if the ingredients also include a carbohydrate source (eg molasses), then growth of human pathogens may be increased.</p>	
Mixed waste 	<p>Mixed waste organics is made from municipal solid waste collections. The material may be pasteurised, and is mainly made from the organics in the mixed waste bin. However, it can also contain physical and chemical contaminants so must not be applied to cropping areas.</p>	
Food waste 	<p>Food waste may be in solid, liquid or dehydrated form. It may contain products of animal origin (meat, dairy). It is therefore a potential source of microbial contamination in a raw form so must not be applied to cropping areas.</p>	
Biosolids 	<p>Biosolids are the by-product of processing sewage sludge. They may be dehydrated to reduce weight and volume, making transport easier. However, many microbes can survive dehydration. Biosolids are also a potential source of chemical contamination and must not be applied.</p>	

 USE WITHOUT RESTRICTION
  WITHHOLDING PERIODS APPLY
  MUST NOT BE USED

For further information on the use of composts and soil amendments in horticulture:

> Freshcare: freshcare.com.au

> Improving soil health: soilwealth.com.au

> Composts for soils: compostforsoils.com.au

> Recycled organics: mraconsulting.com.au

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