

The 'breakdown' on composts



**National Vegetable
Extension Network**

VICTORIA - NORTHERN,
WESTERN & SOUTH EASTERN

The rising cost of fertiliser inputs and a greater understanding of the importance of soil health has prompted interest in the use of composts as a soil ameliorant. What exactly are composts and why would you use them in a vegetable production system?

This fact sheet provides a summary 'breakdown' on the current knowledge of the benefits and risks of composts, with links to further information available.

WHAT ARE COMPOSTS AND HOW ARE THEY PRODUCED?

Composts, also known as 'recycled organics', are decomposed organic materials, that are typically light-dark brown with an earthy appearance and smell. They are made by mixing a balance of carbon and nitrogen rich organic materials (referred to as feedstocks), with water and oxygen to encourage naturally occurring micro-organisms to breakdown the organic matter.

The composting process typically goes through three stages:

- Initial pasteurisation stage where heat is generated (usually in excess of 55°C), which is important to eliminate weed seeds and pathogens from the process;
- Young or active stage where the compost is still very biologically active; and
- Mature stage where the compost will not self-heat to greater than 40°C and has moved towards stabilisation.

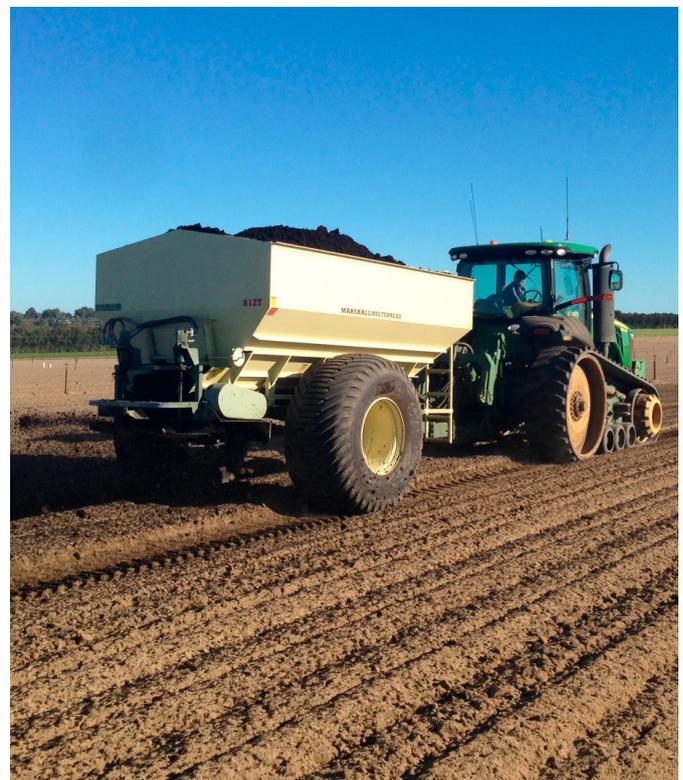
The timing of the process is variable, usually 8 to 24 weeks, and can be stopped at any stage to produce three maturity levels of product.

The use of a variety of organic materials, length of time processed, and composting system used by the different compost manufacturers means compost products will vary from one supplier to the next. Subsequently, the agronomic benefits or long-term soil conditioning effect of different compost products will also vary.

Compost 101: provides a basic explanation of what compost is and its key benefits.

WHAT ARE THE BENEFITS OF USING COMPOST?

To get the most out of using compost, you should be clear about what you want to achieve from the compost in your production system. Compost contains organic matter and a range of macro and micro nutrients that can improve the function and fertility of soil. While composts contain nutrients (mix of immediately available and slow release), composts should not be considered as fertiliser replacement as they do not provide all nutrient requirements for vegetable production, rather they can provide a supplement.



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The main benefit of regular compost use should be considered in the context of overall soil health. Compost adds organic matter to soil which promotes improved soil structure. Other benefits provided by compost can include:

- Provide nutrients to plants
- Better nutrient cycling
- Increase microbial activity
- Improve soil structure and reduce compaction
- Increase root growth, root lengths and root health
- Improve water infiltration and storage
- Create of greater air space in soil
- Suppress diseases
- Weed suppression
- Temperature control
- Reduce soil erosion

Three main points you should consider when selecting a compost for use are:

- Is it **young** or **mature**? This tells you how long the compost is likely to stay in soils and when and when not to use it in your production system.
- Did it have a lot of **nitrogen-rich** input or **carbon-rich** input? This gives you an indication of the nutrients (in particular nitrogen) that will be immediately available to the production system to allow adjustment of other farm inputs such as fertilisers.
- What are the **predominant particle sizes**? This provides guidance on how to use the compost, such as small particle size being appropriate for incorporation opposed to large particles more appropriate for mulching.

Table 1 provides helpful advice you may consider around different approaches of compost use to achieve your desired outcomes.

Composting products: provides an overview of the different compost product types as well as discussing the benefits of using compost. projects.

Table 1: Recommended approaches for compost use in vegetable production

DESIRED OUTCOME	SUGGESTED APPROACH
Improved crop establishment and growth	Regular use of fine grade, mature compost; incorporate into soil at planting – if sand-blasting is a problem, apply compost on soil surface then incorporate into soil after harvest.
Better nutrient management	Regular use of fine grade, mature, high nutrient compost (e.g. manure-based composts or compost/fertiliser blends); apply by banding and incorporate at planting.
Better soil structure	Regular use of fine grade, mature compost that is incorporated into soil at planting.
Better soil moisture management	Regular use of fine grade, mature compost incorporated to improve soil water holding capacity. To prevent surface evaporation, mulch soil with compost.
Reduced erosion	To reduce wind erosion, apply compost on soil surface, and if incorporating, only cultivate into the top few centimetres.
Control plant pathogens in soil	Regular use of fine grade, mature compost; incorporate into soil at planting.

QUALITY

A compost quality standard exists for the manufacturing and testing of compost products, Australian Standard for Composts, Soil Conditioners and Mulches (AS 4454-2012). The standard is designed to give users a level of quality assurance by:

- Providing a method to produce a product that regulates and guides health and safety for unrestricted use; and
- Correctly characterising compost products to enable informed purchasing decisions.

The standard, however, does not attempt to classify products by suitability for any specific end use or application. For the highest form of guarantee for a compost product, producers should request a certified product and test report on the batch they are purchasing.

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RISKS

The main risks and concerns with composts are associated with:

- **Poorly made products with unacceptable levels of impurities and contamination.** Feedstocks used to produce composts can be a source of heavy metals, pathogens, weed seeds, plastics and other waste material. Inappropriate and insufficient management during manufacturing can lead to compost products with unacceptable levels of contaminants.
- **Consistency of the products.** Feedstock availability can vary across the year resulting in some compost manufacturers unable to provide a consistent line of product all year round.
- **Inappropriate matching of a compost product for the intended use.** Product maturity and timing of application for vegetable production is very important. A young active carbon-based compost product applied at planting can cause microbes to draw nitrogen from the soil to break down the compost and starve the plants of nutrients.

Other risk considerations for any grower is electrical conductivity and pH of compost products. Most compost have a neutral to slightly alkaline pH, however this can vary. Composts tend to have EC values in excess of those in soils.

To avoid these risks, compost should be sourced from reputable suppliers. The highest form of guarantee is sourcing product from suppliers who are certified (AS 4454-2012).

FOOD SAFETY AND QUALITY

A simple [decision tree](#) to help guide the use of composts within your program is available. Key considerations to note with using compost under Freshcare certification include:

- Certified compost (AS 4454-2012) can be used without restriction.
- Where composting treatment cannot be verified, it should be managed as an untreated manure.
- Untreated manures (including soil amendments mixed with untreated manures) need to have a minimum period pass between application and harvest, this is at least 90 days if the soil potentially contacts the harvestable part of produce that may be eaten uncooked.

Freshcare compost factsheets: provide guidance for how to produce and use compost without affecting food safety and Freshcare certification. These user-friendly fact sheets explain different withholding periods, record keeping requirements and compost projects.

COST OF COMPOST

The costs associated with compost can be determined by several factors. This includes:

- Type and quality of the compost
- Freight costs based on distance
- Spreading/incorporation costs, which depend on:
 - application rates
 - type of compost
 - machinery required
 - travelling time
 - scale of the work.

It is important to also consider labour and financial costs associated with other practices that may need to change in conjunction with compost application, such as tillage, nutrition, irrigation and crop protection requirements.

What is compost worth?: outlines the economic considerations for using compost in vegetable production systems. It is based on lessons learned from several Australian case studies through the Integrated Crop Protection and Soil Wealth projects.

Further information

For further information on the use of compost in horticulture, the following resources may be of interest.

- Australian organics recycling association: aora.org.au – including a collection of 45 fact sheets that answer specific questions regarding compost use, including the use of compost to manage specific diseases, testing compost nutrient content, and cost benefit trials of compost use.