

Compost Mulch For Orchards

tend to underperform. Methods of spreading should also be determined in conjunction with the compost processor.

Growers should satisfy themselves of the quality of the compost, the processing and the support offered by the supplier. Questions to ask about product quality include:

- Does the material meet the Australian Standard for Composts, Soil Conditioners and Mulches AS4454-2003?
- Is the compost regularly monitored and tested and are some recent analyses available?

In assessing the quality of processing, questions to ask include:

- Is the processor licensed and accredited?
- Can a tour of the processing and collection sites be arranged?
- Can the material be customized and blended? For example, can a coarser texture be made, or can the material be blended with lime or gypsum?
- What strategies does the processor have for managing quality of processing?

Ideally, the supplier will work closely with the grower to develop a material specific to requirements with well defined quality parameters that the grower can expect.

More information

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Summary

- Where a coarsely textured compost is applied at an appropriate rate, compost mulch can offer benefits in yield, quality, growth, water saving and soil properties.
- This study in an Adelaide Hills cherry orchard has demonstrated the potential for economic benefit through the use of compost mulch.
- Compost mulch could be expected to persist for 2-4 years and the effects of a single application may persist even once the material has largely broken down.
- Compost for use in commercial horticulture should be free of plant propagules and pathogens, and should meet the criteria specified in the Australian Standard for Composts Soil Conditioners and Mulches AS4454-2003.



Compost Mulch for Orchards - Cherries

In this field experiment established in 1997, yield and quality increases were measured for three consecutive years following a single application of compost mulch. Results demonstrated the potential for increased yield and quality, along with improvements in soil properties.

Over the past ten years, research across Australia has demonstrated the benefits of compost mulches for horticultural production. Composts of an appropriate texture and application rate have been shown to improve the establishment of young trees and vines, reduce irrigation and conserve soil moisture, increase soil organic carbon, improve soil physical fertility, increase biological activity, moderate fluctuations in topsoil moisture and temperature, improve the effectiveness and longevity of soil renovations and increase yield, quality and crop value. Though there had been much experimental evidence from vineyard studies and newly established orchards, there had been few studies of the effects of vermicompost in mature orchard conditions.

In 1997, a field-experiment was established in a mature cherry orchard to determine whether the benefits of compost mulch, demonstrated in vineyard field trials, could be replicated in commercial orchards.

Treatments (Table 1) were superimposed on the grower's standard practice, without amendment to any fertilizer, irrigation or other inputs. Compost-mulch was produced by a commercial compost processor in outdoor windrows from garden-organics kerbside collections.

Cherries



A coarse grade of compost (>70% of particles >16mm) was used to ensure transmission of water and air through the mulch to the soil. The compost had pH of 6.4, electrical conductivity of 2.5dS/m, carbon:nitrogen ratio of 28 and total nitrogen 1.4% (d.m.).

The experiment was sampled for three consecutive harvests for determination of yield, 100-cherry weight, cherry number per tree and cherry size classes. Yield and cherry size data were used to calculate crop value. Crop value was calculated using the prices received by the grower for various size classes. Measures of soil properties were conducted four years after trial establishment.

Table 1: Treatments Applied to Trial in Mature Cherry Orchard

Treatments
1. Control – no mulch
2. 10mm compost-mulch
3. 50mm compost-mulch
4. 150mm compost mulch





Yield and Quality

Measures of cherry yield and quality were conducted for three consecutive years following application of mulch treatments. Over this period, differences between treatments were not statistically significant. Yields were higher than the control with the 10mm and 150mm applications of compost mulch and were comparable to the control with the 50mm depth (see Figure 1).

Plant Growth and Soil Properties

Plant growth and soil properties were measured four years after trial establishment. There were no significant differences in trunk growth, although all treatments had higher basal trunk area. Trees with 10, 50 and 150mm of compost mulch had basal trunk area 6, 8 and 3% greater respectively.

Infiltration rate was increased by over 50% with 10mm of compost mulch, was doubled with 50mm and increased by 130% with 150mm compost mulch. The water holding capacity of the soil was increased and soil with 150mm of compost mulch held almost twice as much moisture in the top 10cm of soil when measured during winter.

Figure 2 – Steady infiltration rate (mm/hr) of water into the soil surface beneath different depths of compost mulch applied four years previously, Forreston, South Australia.

Benefit-Cost Analysis

In 1999, The South Australian Centre for Economic studies undertook a benefit-cost analysis of the use of compost mulch in cherries, using the first two years of harvest data available at the time.

Yield and cherry size data were used in conjunction with prices received by the grower for each size class to estimate the economic benefits of a single application of compost mulch costing \$24.50/m³ including delivery and spreading.

The 10mm application of compost mulch was found to return \$73.80 for each \$1.00 invested by the grower in the mulch, two years after application. The 50mm and 150mm applications were found to return \$0.13 and \$2.10 per \$1.00 invested respectively.

The potential cost savings with reduced irrigation were also estimated. With reductions of 10-30% in irrigation, savings of \$15-\$45/ha could be expected.

These results demonstrated the potential for economic benefit through the use of compost mulches in horticulture.

Compost Mulch For Orchards

Composts can have short and long term benefits in horticulture. Used as a mulch, an appropriate grade and application rate can give immediate benefits in water-saving. Over the longer term, the compost can become incorporated in the soil, improving soil structure and biological activity and increasing the capacity of the soil to capture and store water and release soil nutrients.

Increased infiltration is one of the effects most commonly seen with compost mulch. Increase infiltration allows capture and storage of more irrigation and rainfall and reduces pooling of water under the drippers and loss via evaporation. With increased capture of rainfall, more can be stored and run-off carrying water and nutrients into waterways can be reduced. Other advantages include reduced soil strength, increased water holding capacity and greater soil biological activity. Improvements in growth, yield and quality have been recorded where coarsely textured composts have been applied at an appropriate application rate.

Instances of poor performance with mulches, or reduced effects with increasing application rate have demonstrated the need to choose appropriate grade (composition of

particle sizes) and application rate. Fine materials applied too deeply can absorb irrigation and rainfall and encourage root growth within the mulch. A coarsely textured material will allow transmission of rainfall and irrigation to the soil surface more effectively and research has shown that these coarser composts are likely to perform well as a mulch. Finely textured materials should not be applied at depths greater than 20mm.

A coarse compost mulch applied at 50mm depth could be expected to be effective for 2-4 years, with benefits ongoing through improvements in soil properties.

To ensure the best value and performance from compost mulch, growers should first decide what benefits they expect from the mulch, and therefore what physical and chemical properties it should have to be effective. The advice of a consultant or researcher with experience in using compost mulches may be useful at this point. Once the desired properties have been established, a budget can be set – it may be most worthwhile to target compost mulch application at areas of the orchard which are on a more difficult soil type or

Figure 1 – Cherry yield, 100 cherry weight and crop value (means of three consecutive harvest years) with mulch treatments applied to the soil surface in orchard, Forreston South Australia.

