

Compost and manure

A variety of composted material is used in the Northern and Yorke region to improve soil health and provide cover. This fact sheet describes the bulk materials being used, their characteristics, how they are used in different industries and any issues. Examples are given for the nutrient content of some products although these will vary significantly with the source.



Figure 1: Example of a custom tarac composted mulch - blend of marc, straw, scalps and green-waste mixes spread on a vineyard in the Barossa region (applied in 2017).

Products

Compost – Compost is comprised of organic material that has undergone aerobic and thermophilic (hot) decomposition. Compost products are placed on the soil surface or mixed into the profile. Mostly used in horticulture.

Manure – Mixture of animal faeces, urine and bedding materials and has undergone aerobic decomposition. Manure is usually mixed into the profile in horticulture and applied on surface in broadacre. Analysis of nutrients of

specific manure products is recommended as manures are hard to generalise. Mostly used in broadacre and horticulture.

Manure supplies more mineral nutrition per tonne applied when compared to compost.

Mulch – Any organic or inorganic material (including straw) placed on soil surface as a protective cover to reduce water loss and prevent weeds. Mostly used in horticulture.

Biosolids – Treated sewage sludges comprised of dead microorganisms, small portion of active microorganisms and inert

solids such as sand that may enter the sewage system. This product contains a high amount of nutrients and normally contains between 15-90% solid material. Mostly used in broadacre as restricted use in horticulture.

Living mulch / ground cover



Figure 2: Example of living mulch under the vineyard rows in the Barossa region. Medic is a short season annual and will use less water than perennial grasses.

Living mulch and ground cover refer to planting crops, pastures and/or grasses that are not for direct use and are alternatives to straw mulch or bare soil under the vine row. These plants will improve overall soil health by suppressing weeds, retaining nutrients, and improving soil structure and biological activity. They are recently trialled in viticulture and are also cheap and decrease herbicide use. When undervine, water competition is an issue, particularly when using longer season plants.

Broadacre for green manure – Green manure is sometimes used in a similar way by growing annual mixed ground cover instead of a crop. In early spring it is chopped and killed off and the organic matter can be dug into the soil or left on the soil surface. The benefits of this can include improved soil structure, water, and nutrient retention. However, as a crop is not harvested, returns will be less. Nutrient content of the green manure can be assessed through lab analysis, although some nitrogen will be lost due to mineralisation and volatilisation.

Benefits

Application of organic matter will improve the structure and health of the soil as well retain moisture and nutrients. Additional benefits outlined in Figure 3.

A project completed by SARDI for the Barossa Grape and Wine Association in 2022 analysed the effect of compost and mulches on undervine soil health across six sites. The Barossa region includes sandy red brown earths particularly vulnerable to surface sealing, sands to loams over sodic poorly structured clays, acid sandy loams over clay and some areas of self-mulching clays.

Benefits observed from composts/mulches include greater microbial action, improvements in soil structure and better moisture and nutrient retention. The analysis of the various sites where surface and in some cases sub-surface compost treatments have been applied, has helped to determine the effectiveness of treatments given most occurred several years ago.

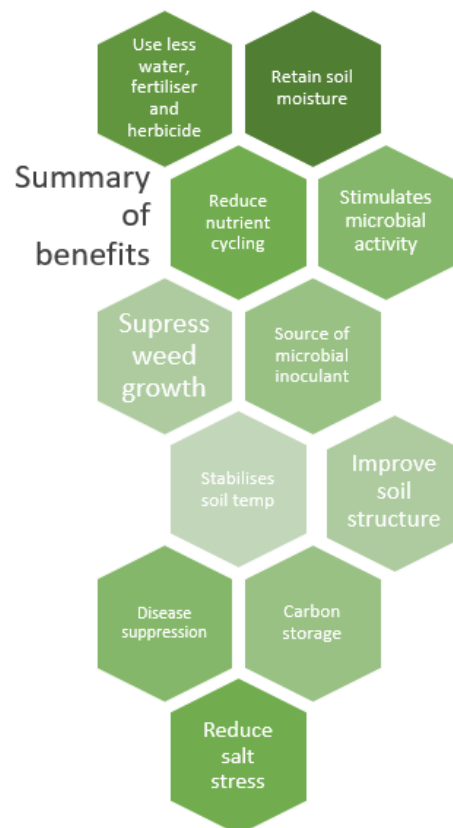


Figure 3: Key benefits to soil from applying organic matter.

Custom blends

Using a compost, manure or mulch product as a base, adding soil amendments such as gypsum, lime, fertilisers, liquids or biodynamic preparations can provide additional benefits. These generally target a deficiency (e.g. correcting phosphorous) or production constraint and by mixing the products, reduces application time, lowers spreading costs and saves on fuel and labour. Custom blends are a commonly sought product, particularly in horticulture.

Before you start

Before applying a product, it is important to consider several factors to ensure the product will provide the best bang for buck as well as meet current product regulations. Analysing the composition will also prevent over-supply of nutrients and avoid exacerbating any current soil constraints. Key considerations include:

- What soil constraints are present?
- What are your objectives?
- What is the composition of the products available?
- What application rate will you need and what is the cost?
- Does the product meet Australian standard AS4454-2003?
- Is there information on the efficacy of the product?

Application

Manure usually requires a high-volume specialised spreader to spread manure effectively. Due to time and cost, many farmers will elect a portion (say a third) of their cropping paddock to be treated in any one year. Chicken litter application rates of 2.5 to 3 tonnes per hectare (depending on nutrient content) are commonly applied to increase nutrients in soil reserves, rather than maintain nutrients at rates of 1 to 2 tonnes per hectare. The phosphorous and zinc in chicken manure becomes available, however

some of the nitrogen will be lost due to volatilisation and leaching.

Biosolids for farming use are air dried and milled and spread by a gypsum or line spreader. Typical rates of application are 5t/ha for dryland crops and 10t/ha for irrigated permanent crops (citrus or vines). Maximum rates apply depending on concentration of metals in the batch of biosolids and existing levels of heavy metals in the topsoil.

Composted mulch can be used in two different ways when establishing a vineyard, either as a mulch or incorporated into the soil. Applications of mulches, composts and manures are generally made prior to budburst. Start with a small area of application, ideally an area with poor productivity not prone to waterlogging. This will identify any issues and benefits. For coarse compost mulches, apply between 120-180m³/ha of row. For finer composts apply approximately 80m³/ha of row.

How to cost out nutritional content

It is important to compare nutritional value between products to ensure efficient application as well as to determine if the product will meet the needs of the crop or soil. A nutritional analysis should be sourced from the provider. If not, send samples to soils lab (APAL) for soils analysis.

- To calculate kg/t of a nutrient, nutrient content = % of the nutrient x 10
- If in ppm (mg/kg) the kg/t = nutrient in ppm /1000.

It is important to use the wet weight figures when calculating kg/ha as many composts contain a significant amount of water.

Care and Legal aspects

Manure

Heavy manure application can lead to an excessive build-up of phosphorous and so the rate must be carefully considered. Manure

products will have varying concentrations of nutrients depending on where they are sourced. Obtaining a nutrient content analysis is recommended to ensure the product represents good value.

Un-composted manures can have toxicity issues. They will also have a loss of nitrogen to the atmosphere.

Tip – View the nitrogen supplied in chicken litter as a ‘bonus’ when weighing up the economics of chicken litter versus conventional fertilisers as immediate cultivation or rainfall following application whilst would increase N, is impractical.

It is also illegal to feed animal-derived meal to ruminants or allow them access to it. This is to prevent the spread of toxic animal diseases. Stockpiles of manures must be fenced off from livestock to prevent access.

Biosolids

The EPA has a range of requirements that need to be met before approval for use of the product. This will include things like the salinity rates of irrigation water used as high rates may mobilise heavy metals. For this reason, biosolids should not be applied to irrigated field crops and vegetables. Please refer to SA Water’s website for my information (www.sawater.com.au)

Mulch

Organic coarse mulch graded with woody particles are recommended, as this will encourage water and air to move through the soil (between 5-8cm deep and 40cm wider under vine).

Compost mulches

The type of compost applied, farm location, climate, soil type and management costs will influence the uptake of nutrients from compost.

Areas prone to frost or waterlogging, compost mulches or straw should not be applied.

High rates of fine compost are not recommended as they can prevent water from moving into the soil.

Some composted mulch has been contaminated with plastic. As processes improve this contamination will reduce.

Further reading materials

- Guidelines for the safe handling and reuse of biosolids in South Australia - https://www.epa.sa.gov.au/files/14641_guide_biosolids.pdf
- Best practice guidelines for using poultry litter on pastures - https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/140359/Best-practice-guidelines-for-using-poultry-litter-on-pastures.pdf
- Chicken litter as fertiliser for broadacre grain crops - <http://www.nuleafororganics.com.au/wp-content/uploads/2017/02/Chicken-Litter-Users-Guide-V4-1.pdf>
- Recycled Organic Fertiliser Factsheet - https://grdc.com.au/_data/assets/pdf_file/0017/21554/grdcfsrecycledorganics.pdf.pdf
- A factsheet on ‘Compost Sources in the Barossa’ and a factsheet on ‘Soil health impacts of applying mulches and compost in Barossa vineyards’ are available upon request.

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More information

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