



Compost for olives – a case study from The Food Forest, South Australia

Who

Graham and Annemarie
Brookman, The Food Forest

Where

Hillier (near Gawler),
South Australia

What

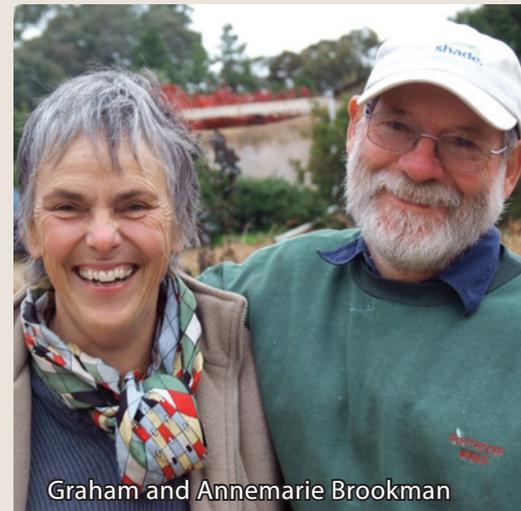
Organic olive orchard
(although around 160 varieties
of other organic crops are also
grown on the property),
on alluvial silt up to 20m deep

Aims

- to improve soil structure
- supply balanced fertiliser
- increase production by rapidly increasing soil organic carbon

Outcomes

- production has risen steadily since the introduction of compost, with yields lifting 50% in the last 4 years
- soil organic carbon levels have increased from 0.7% to 3.5% and soil fertility is now close to ideal



Graham and Annemarie Brookman

The Food Forest

When the Brookmans started The Food Forest, the organic carbon level was a very low 0.7% and the soil would “turn to slush in winter and set like concrete in summer”. A plough pan at a depth of 150-200mm caused localised flooding and stunted the root growth of almost all crop species. Soil at the property was highly saline and consisted of alluvial silt up to 20m deep (typical of the Gawler River flood flats) with a pH of around 6.5.

The Brookmans invested in a single tyne ripper for preparing tree lines and an agro-plough to destroy the hard pan. This gave trees access to a shallow aquifer (15m underground) which was supplemented with irrigation water from a bore drilled onsite. Gypsum was applied to the orchard at 3 t/ha

to boost calcium levels and help displace the high levels of sodium that had contributed to the hard setting nature of the soil.

Building soil carbon and nitrogen has been an ongoing challenge on the certified organic property. Large crops of triticale have been turned in to boost carbon levels. Inter-row swards have been sown with vetch, clovers and medics to build soil nitrogen.

Overall, green manuring had been used on the property since 1985. Geese were also used to graze the property which helped to cycle crop wastes back into the soil in a form readily available to plants.



Graham Brookman and Alan Mackenzie (spreader contractor)

Why compost?

Organic carbon levels had been slow to rise on the property, despite green manuring and grazing. When certified organic compost became available, the Brookmans began biennial applications of compost. They needed to improve organic carbon, health and structure of the soil and provide balanced nutrition to their plants. An added bonus for the Brookmans was that the concept of taking waste from urban areas and using it to grow food that is sent back to urban areas fell into step with their permaculture philosophy.

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“The fertility benefits of compost are immediate but the soil conditioning effect takes a year or two to kick in - when it does it lasts for years.”

Graham Brookman, The Food Forest



Choose the right compost

“The massive rise in soil carbon has improved soil texture and soil fertility is now pretty much ideal. This has added significantly to both productivity and property value.”

Graham Brookman, The Food Forest



On-farm compost production

The compost product

The Food Forest makes 10-15 tonnes of compost each year from the processing of tree crops and grapes and they also source certified organic compost from commercial suppliers. A significant amount of available nitrogen is present in this compost as a result of the animal manures and urine in the feedstock. This means that the compost is competitive on price with chemical fertilisers as far as macronutrients are concerned. The micronutrients and organic carbon are an added bonus.

A typical analysis of the compost used by Food Forest (w/w dry basis) is given opposite. Nutrients and trace elements are derived from natural ingredients.

Organic Carbon	35%
Total Nitrogen (N)	2.0%
Total Phosphorus (P)	0.4%
Total Potassium (K)	1.0%
Total Sulphur (S)	0.39%
Total Calcium (Ca)	1.4%
Total Magnesium (Mg)	0.35%
Total Iron (Fe)	0.39%
Total Manganese (Mn)	0.01%
Total Copper (Cu)	0.01%
Total Zinc (Zn)	0.01%

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“We used to use deep litter from poultry farms that we composted ourselves... it was smelly, unhealthy and dangerous work as someone had to ride on the spreader to prevent bridging of the compost.” Graham Brookman, The Food Forest

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Compost application

Every second year, 225m³ of compost is spread on the property by a contractor who uses machinery specialised for application along tree rows. Compost spreading at The Food Forest costs around \$30/m³. Existing plantings receive about 30m³ of compost per hectare but it is concentrated on the rows to achieve a depth of 1-2cm of compost in the tree row.

Ideally applications would be done annually at The Food Forest, but the costs (particularly spreading) have to be weighed up against progressing other projects on the farm. In the years in between compost spreading, spot applications of compost are made under each dripper. When planting new trees, compost is added to the planting hole at a rate equivalent to about 100m³/ha.

There were some initial problems spreading compost, but with advances in compost production the material now flows well through the equipment.

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“Any horticulturalist whose property is within reasonable transport range of the composting businesses would be crazy not to use compost.” Graham Brookman, The Food Forest

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Choosing compost for your orchard

Choosing the right compost for your orchard will depend on your specific needs. A variety of compost types can be used to achieve different aims in your orchard. Compost can be used as mulch or incorporated into the soil. Compost can be tailored for water saving, remediation of saline soils and can get young trees off to a great start at establishment and assist in orchard renovation.

All composts must meet the Australian Standards (AS4454) as a minimum. As a general rule, compost should be free from visual contaminants and not hot. Compost should also be free from bad odours - the myth that compost must smell bad in order for it to work well is now well and truly busted.

Compost used for soil incorporation is generally fine in texture and it should always be fully composted and stabilised. Coarse textured compost is the most appropriate for use as mulch. It should have larger woody particles, which help water and air reach the soil easily. The decision to choose coarse or fine textured compost will depend on the specific needs of your orchard.

Once you have chosen the right compost, it is important to make the most of it! Good monitoring of soil moisture is vital to ensure that you are not irrigating unnecessarily. Monitoring soil and plant nutrient levels can also help achieve best value from the compost. Fertiliser applications may need to be adjusted to account for the extra benefits your orchard will receive from compost application.



Spreading compost under olive trees

The bottom line...

Yield has increased by 50% over the last four years since higher levels of compost have been used at The Food Forest. The number of staff has also tripled due to increased production.

Building soil carbon and nitrogen was an ongoing challenge on the certified organic property and using compost has increased soil organic carbon levels from 0.7% to 3.5%.

As well as the obvious financial benefits of increased yield, the Brookmans have identified many other benefits from using compost on olives and other crops:

- irrigation applications are 25% more effective due to better moisture infiltration and water holding capacity as well as lower soil temperatures and less evaporation
- increased moisture infiltration and water holding capacity - often 100%
- increased root and vegetative growth
- higher levels of biological life in the soil
- improved cation exchange capacity
- increased predator activity (natural enemies of pests)
- higher worm numbers
- soil is suitable for cultivation and seeding over a longer period of time
- saves time when seeding as the fertiliser has been pre-applied
- significantly increased production and property value as a result of the improved soil fertility and texture through increasing soil organic carbon levels
- keeps your feet warm on cold mornings!

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“Compost and mulch are particularly important in olive growing as the species has a wide, fairly shallow root system and benefits enormously from cool soil with a steady supply of nutrients and water.”

Graham Brookman, The Food Forest

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Compost delivery

Where to from here?

The Food Forest is currently trialling the application of composted mulch to complement their composted soil conditioner applications. It is expected that using mulch will further improve water use efficiency and increase crop production. Mulch will be applied in a 75mm thick band approximately 1m wide under the olives (as well as other tree crops and vines). Dripper lines will be placed above the mulch as both water from irrigation and rain is expected to take nutrients from the mulch into the root zone.



Earthworm in improved soil

For more information on the program contact:



An initiative of Compost Australia

www.compostforsoils.com.au

the resource for compost users