

EcoResearch

for the environment

Post: 92 Angas Road, Westbourne Park, SA 5041

Phone: 61-8-8271 4173 Fax: 61-8-8339 8062

Email: johnbuck@chariot.net.au

ABN: 22 938 250 998



To: Eric Love, Chris Rochfort
CORE

From: John Buckerfield & Katie Webster

Re: Recent research with compost mulches

Date: 1/04/02

Compost-mulches made from urban 'compostable organics' and from rural-industry wastes such as orchard-prunings, grape-marc, mushroom-compost, wool-washings, animal-manures and forestry-wastes are proving invaluable for more efficient use of water and nutrients in horticulture.

Our research in key horticultural regions throughout Australia has confirmed the significant benefits of compost mulches in conserving water. A centimetre of soil-covering reduced evaporation under oranges – within two days of watering, twice as much water held in the topsoil under the mulched trees. With a compost mulch under vines, we calculated that **water-use could be reduced by up to a third**; with the biggest inputs of salt often originating in irrigation water, mulch can have a significant impact in **reducing soil salinity**.

We have seen the benefits of mulches in vineyard establishment. Within six months, the **mulched rootlings had doubled in size**; without the mulch, the vines were still only half way to the wire. Mulch reduced stress on young vines – at first harvest, bunch-numbers had doubled and grape-yields tripled.

And now, after a fifth harvest in vineyards, we've confirmed that growers can maintain production, and quality, with **reduced reliance on irrigation**. Mulching can provide greater control over crop development and, at the same time, contribute to responsible management of water-resources.

We can also expect the use of organic mulches will allow **more efficient use of fertilizers**. Leaf-yellowing indicated severe symptoms of nitrogen-deficiency in young citrus trees – within six weeks, a healthy green confirmed that the effects of chlorosis had been corrected in the trees treated with mulch. And we've seen similar responses with pears too – the mulch enhanced the action of corrective nutrients – a single application of compost succeeded where years of chemicals alone were not sufficient.

The studies we commenced with CSIRO have been continued by *EcoResearch*. And a recent harvest has convinced us of the value of mulching mature vines too – within three months we had **increased yields** of export table-grapes by one-third, and larger berries increased the value even further. Similar increases in the size and yield of export cherries, significantly increased the returns from mulched trees; for the next three years, we recorded higher yields and **improved fruit quality**.

Now we're seeing the longer-term effects of mulching on soils too. **Soil biodiversity has been enhanced** with compost – the additional earthworm activity has not only improved soil-structure, but also significantly increased water-movement and storage in the rootzone. As well as **increased water-holding**, we've measured substantially **increased**

water-infiltration, and surprising **reductions in soil-strength** with **improved water-movement** and **extended root-penetration**.

We've also demonstrated the benefits of **mulches for weed-control**; compost mulches can significantly reduce the need for chemicals for weed-management. In addition to saving the significant quantities of water 'wasted' with weeds, we've shown that an appropriate grade of shredded prunings have also **reduced the use of herbicides**, and the risk of contamination of waterways.

Standards - for use in commercial horticulture it is essential that standards are maintained, to ensure compost of a consistent quality. Collection and screening must be monitored to minimize 'non-organics' contaminants. The composting process must be strictly controlled to eliminate weed-seeds and plant-pathogens and to ensure a stabilized and 'safe' soil amendment, with compost conforms to Australian Standard AS4454-1999^e.

It is essential that this clean green-waste is not used for disposal of other wastes which are not acceptable in industries associated with food production. Contamination with plastics and other household refuse is not acceptable where it could compromise growers in Quality Assurance Marketing programs. To comply with food safety regulations, disclosure of any non-organic additives in the compost may be required; this will be essential when the compost is to be used by registered organic growers. Regular analysis will be required if the compost is to be used to provide nutrients, to supplement existing fertilizer practices. Standards are needed to specify appropriate grades of compost for surface-protection or soil-incorporation.

Our research with composts has been directed at a number of environmental health issues – water-conservation, soil 'health' and waste-management. We've used composted 'green-organics' from domestic collections, and have demonstrated significant water-savings and the potential to reduce inputs of herbicides and fertilisers.

EcoResearch - our recent research activities have involved collaboration with variety of horticultural industries in last few years. We've run field trials in vineyards and orchards and with vegetables and flowers - table- and wine-grapes, carrots and capsicums, cauliflowers and cabbages, potatoes, tomatoes and egg-plant, plums and nectarines, olives, avocados and guavas, oranges, lemons and mandarins, apples, cherries and pears, barley, and and cotton, mangoes and mushrooms, as well as cut-flowers.

During the past year we've overseen projects in Moree and Margaret River, from Harvey to Hervey Bay, and have advised on the installation of field-trials in the Barossa Valley and Broken Hill. We have coordinated field-studies in orchards and glasshouses throughout Australia and have been involved in collaborative activities with colleagues in pastures in New Zealand; we are supervising product-development trials with vegetables and tree-crops in the Middle East.

In addition to 'green-organics', we've trialled an assortment of processed organic 'wastes' including paper, grape-marc, cotton gin-trash, mushroom-compost, and a variety of vermi-products. We've been involved in community studies of sustainable agriculture, and cooperative research in broadacre cropping and grazing and intensive horticulture; we've collaborated in research for soil rehabilitation and as well as revegetation projects.

More details on the research by John Buckerfield and Katie Webster have been published in the *The Australian and New Zealand Grapegrower and Winemaker*: "Pellets for soil improvement at planting" (October 1999), "Vineyard trials show value of mulches. Organic matter for better water management" (October 2000), "Responses to mulch continue – results from five years of field-trials". (October 2001), "Managing earthworms in vineyards – improve incorporation of lime and gypsum". Annual Technical Issue (2001).

John Buckerfield

John Buckerfield
Research Director

Katie Webster

Katie Webster
Research Coordinator

^e Standards Australia (1999). Australian Standards - Composts, Soil Conditioners and Mulches. AS4454-1999.

'Green-organics', composted according to the standards, poses little risk of spreading plant pathogens and weed-seeds and, with a lower C:N ratio, is unlikely to cause the nitrogen-drawdown associated with straw. The compost seems not to be a problem in fire- and frost-prone areas, where straw is considered unsuitable.

Grades - finer grades of compost may be appropriate for incorporation in the soil at planting to add organic matter to improve soil structure and water-holding capacity. The longer processing time, additional monitoring, turning and shredding or screening to produce a fine-crumb material will add to the cost and cannot be justified for compost used as a surface mulch, but can be considered for pre-planting soil preparation.

We consider that a mix of coarse and fine 'green-organics' compost is most appropriate for a vineyard mulch - the finer fraction is readily incorporated by earthworms in the soil - the coarser materials will continue to provide protection for the surface. After five years of field observations, it is obvious that residues from 5 - 10cm of this mulch will continue to provide significant benefits to vineyard soils, without reapplication for at least 4-5 years.