

Building soil wealth in the south-west of WA

**Horticulture
Innovation
Australia**



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On September 17th a field day on biofumigation at David and Lee East's Bewray farm at Manjimup, WA attracted over 45 growers and industry specialists.

The field day was held as part of Horticulture Innovation Australia's (HIA) national Soil Wealth program, which aims to communicate information to farmers about practical and economically sound practices to improve soil health

The field day speakers included grower David East, leading vegetable agronomist Mike Titley and 2015 AUSVEG *Researcher of the Year*, Dr Doris Blaesing.

Also speaking was Deb Archdeacon, a passionate advocate for sustainable agriculture who has promoted a range of effective approaches to improving soil wealth in the South West of WA for many years.

Around 45 people attended the day including many farmers, agronomists, government agencies and machinery dealers. Along with many local vegetable farmers, who travelled from Perth, Busselton and Bunbury to attend the field day.

David and Lee East have been vegetable growers in Manjimup for over 25 years where they grow baby leaf and contract lettuce over the warmer months.

Four years ago David, began including a cover crop of Caliente mustard for green manure and biofumigation purposes into his cropping mix.

How Caliente mustard works as a biofumigant

All brassica crops contain glucosinates which give brassicas their hot and spicy flavour (think horseradish and wasabi). However, most brassica crops for human consumption have been bred for less of these compounds to modify their flavour.

In nature, the presence of these glucosinates probably provided some repellent effect against chewing insects.

In Caliente mustard these glucosinates have been maximised. When the crop is mulched and incorporated, in the presence of moisture, the glucosinates breakdown to produce the biofumigant ITC (Isothiocyanate).

It is this biofumigant that is active against weeds and many soil borne diseases including Pythium, Rhizoctonia, Fusarium, Verticillium and Sclerotinia. It also has a suppressant effect on nematodes.

The cropping program

David and Lee East's production season begins with first plantings of lettuce and baby leaf in late September and the final harvest is in late May.

Caliente is sown in April-May after the crop residues of the summer leaf program have been incorporated. It is generally a 120–130 day crop in the Southern Forest region of WA. The field day was timed to coincide with the incorporation of the Caliente crop into the soil so that visitors could witness this critical process that entails a three-pass operation.

The forest soils on which the Easts farm are high in organic matter and can be prone to tie up phosphorous through elevated aluminium levels.

The process

The optimal stage to mulch the Caliente crop is when the crop is at around 30% flowering. This is when the beneficial fumigant compounds within the plant are at their peak.

The soil needs to be moist at the time of incorporation to obtain maximum benefit from the breakdown process. The crop is mulched down to ground level in a single pass and then has two passes with a speed cultivator before being rolled with a heavy roller to seal the soil.

Sealing the soil is important to ensure that the gases released during the breakdown of the crop are activated against weeds and plant pathogens in the soil. If the soil is not rolled much of the 'active' moisture in the crop will evaporate and weaken the impact of the process.

Importantly, the three passes need to be done within a total of twenty minutes.

Growing Caliente

Prior to planting the crop David deep rips his soil in both directions to a depth of around 50cm. The crop is seeded between early April and mid May. It is important to get the crop established whilst there is still some warmth so that it has enough bulk before the winter slows it down.

Crops were seeded this year at around 10kg/ha No fertiliser is added to grow the crop with David relying on the residues from his summer leaf cropping program.

No herbicides are necessary as the crop smothers all competition. It is then just a matter of timing of incorporation which will generally be in September or around 120–130 days from sowing.

The benefits

Though David stresses that Caliente and will not solve all of a farmers soil problems, he has observed a range of beneficial effects. These include

- **Suppression of soil borne diseases.** Diseases like Pythium and Rhizoctonia resulting in fewer seedling losses and less fungicide use in subsequent crops. He told his fellow farmers that in the crops that he has grown following Caliente that he has not had to use a fungicide at all.
- **Weed suppression.** The suppression of weeds has been significant, firstly from the crop smothering weeds during the crop growth and secondly from the fumigation effects of incorporating the crop. Wild radish in particular had been largely suppressed resulting in less need for herbicide.
- **Green manure.** The Caliente crop on the East's property grew around 80t/ha of bulk above ground not counting the roots. If we assume a dry matter content of around 8% and a phosphorous content of around 0.6% in the crop, then the incorporation of the Mustard is putting

35–40kg of Phosphorous per hectare back into the soil in an organic form. Because the Caliente crop is deep rooted, much of the recycled nutrients are being brought up from deep in the soil profile, nutrients that would be normally unavailable to subsequent vegetable crops.

- **Improvement in the moisture holding capacity and infiltration of water into the soil.** Where particular paddocks on the property had been prone to slipping and runoff after heavy rains, soils that had crops of Caliente incorporated were able to absorb the water without eroding or having runoff.

Aside from these benefits the general health and fertility of the soil is enhanced through increasing organic matter in the soil.

Dr Doris Blaesing pointed out to the field day participants that "increasing the organic carbon in the soil stimulates a diverse range of soil microbes as well as worms".

"The diverse range of microbes provide a buffer against infection and stimulates increased mycorrhizal activity in the microenvironment around the plants' roots enhancing soil fertility", Doris said.


David East said "Caliente is not a silver bullet but another safe and effective means by which farmers can increase their soil fertility as well as a tool for combatting soil borne pathogens and weeds".



CALIENTE ready for mulching.

"Caliente is probably not suitable for rotating with brassica vegetables but other crop rotation practices such as the use of fumigator sorghum and the judicious use of lime and compost are also practices gaining favour in the south west", David said.

The Soil Wealth program has a further two years to run with further field days planned to showcase to farmers practical and economically smart ways to improve their soils.

This project has been funded by Horticulture Innovation Australia Limited using the vegetable levy and funds from the Australian Government. 

MORE INFORMATION ►

For more information contact Danny Fyffe on 0437 353 748, or you can visit the AHR website www.ahr.com.au or the Soil Wealth website www.soilwealth.com.au

CALIENTE chopped ready for incorporation.

