

# Ground-breaking compost trials boost Canterbury paddocks

words WasteMINZ



*Spreading the love: A muck spreader applies compost to Canterbury paddocks.*

Every year, an estimated 100,000 tonnes of Canterbury's kitchen and garden waste is currently diverted away from New Zealand landfills to be converted into high quality compost. Large-scale compost production is increasing, and as with many other countries, New Zealand's supply of compost currently exceeds demand.

While the agricultural sector has been enthusiastic about using compost, uptake has so far been limited.

Part of the reason for this, says Transpacific Industries' Organic Processing Manager Geoff Hemm, is that farmers lack information on the cost of using compost against the benefits they are realistically likely to gain.

## LARGE-SCALE RESEARCH

This situation is set to change with a research project involving municipal compost field trials in Canterbury.

The trials, the largest of their kind in New Zealand, were commissioned by the Canterbury councils (Christchurch City plus all the district councils) in collaboration with Transpacific Industries and Environment Canterbury. The work was undertaken by Plant & Food Research and initiated at Karina Downs near Albury, South Canterbury, in 2007. Preliminary results were promising and the project was later expanded to encompass four trial sites.

## A COLLABORATIVE EFFORT

The research brings together expertise from the farming community, councils, the composting industry and research providers. In its expanded form it is funded by the MAF Sustainable Farming Fund, Transpacific Industries Ltd, Canterbury Waste Joint Committee, Environment Canterbury, Ballance Agri-Nutrients, the Foundation for Arable Research and has gained in-kind support from Living Earth Ltd, Plant & Food Research, Ministry for the Environment and field trial host farmers.

The aim of the trials is to assess how compost affects the establishment, yield and quality of different crop types such as ryegrass, forage kale, barley, maize and wheat. The trials will also assess whether compost can help improve the health of the soil to which it has been applied.

Compost contains a range of nutrients which benefit plant yield. A key challenge is to determine the appropriate application rates of these nutrients relative to plant uptake and the overall fertilising regime for the farm.

**“We need to improve understanding of how nutrients in compost can work alongside fertiliser application in integrated nutrient management,” says Geoff. “Farmers will then be able**

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Karina Downs owner Andrew Kerr in the forage kale trial in February 2008. Compost was applied (L-R) at 0, 25 and 50 t/ha.

## to apply compost to those crops which give the best return on investment.”

Plant & Food Research soil researcher Craig Tregurtha says part of what makes this project so significant is that the trials are the first comprehensive long-term agricultural field trials involving municipal compost in this country.

“We began in 2007 with the first two trial sites at Karina Downs, and we’ll continue monitoring all four trials, plus a fifth trial to begin soon, through until 2012. The research involves a detailed suite of measurements, which will make the results compelling.”

Craig cites the Karina Downs forage cropping trial as an example of the detail involved. Twenty-eight plots were established in a bare paddock, each plot measuring 20 by 40 metres. Each of the plots received a single application of compost sourced from the Timaru composting facility, applied at either 25, 50 or 100 tonnes per hectare (with the control plots receiving no compost). The first of six crops, forage kale, was then planted. It was not fertilised at sowing, but subsequently received two applications of urea to boost nitrogen for plant growth.

“We have been carrying out extensive monitoring during the trial,” says Craig. “This includes numerous soil quality measurements and assessments of yield and feed quality at the completion of each crop.”

The other trial at Karina Downs was a demonstration pasture crop, with Italian ryegrass planted in plots close to the road so the public could see the effects of compost use.

Preliminary results from the initial three years of the Karina Downs trials were impressive, showing that compost significantly improved soil quality and fertility, and boosted the yield of both the pasture and forage crops.

As a result, a third trial site was added at Lincoln in 2009. This time a typical Canterbury arable crop rotation was

chosen. Forty-eight plots were established on an irrigated site spread with compost sourced from the Christchurch composting facility run by Living Earth. The compost was spread in single applications (25 and 50 t/ha, with control plots receiving no compost) plus two split application rates (8.3 and 16.7 t/ha annually) across the plots. Four rates of nitrogen fertiliser were also applied. Over three years, these plots will be planted in maize, followed by autumn wheat, then oats and Italian ryegrass, and finally spring barley.

The fourth site, an ex-forestry trial at Bankside, is a demonstration trial to illustrate the benefits of compost on impoverished soils newly converted to pasture production.

A fifth site is expected to begin in spring 2010 at an intensive vegetable production property in North Canterbury.

## COMPOST PERFORMS FAVOURABLY

Initial (three year) results from the Karina Downs forage and pasture trials show that a single application of municipal compost improved the yield of the forage crop and pasture for at least two years. Follow-up compost applications may be required every two to three years to maintain elevated yields and general soil condition.

At the arable trial, compost was found to boost plant yield in the first season. Compost on its own did not supply enough

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nutrients to meet the high demands of an establishing maize crop. However, compost enabled the plants to better utilise nitrogen in the soil - indicating that it could be used alongside fertiliser to boost yields.

The benefits of compost appear to be associated with an increase in the supply of plant-available nitrogen. However other nutrients in the compost (such as phosphorus and potassium and even the micro-nutrients) may also play an important role. Low nutrient soils may especially benefit from compost applications.

**Compost increased soil organic carbon at all the sites, which is particularly significant because cropped soils typically undergo a gradual depletion of organic matter with time.**

Results suggest that sustained applications of compost may be required before carry-over improvements in soil physical properties such as aggregate stability will occur.

#### FURTHER RESEARCH

The research is being continued over the next two years. Further measurements will enable the longer-term effects of compost in agriculture to be quantified.

Geoff Hemm says an important outcome of this research will be to help close the loop from a waste minimisation perspective.

“The researchers undertaking this project are to develop guidelines to help farmers use compost optimally. This should lead to greater uptake of the product. In turn, waste managers will have the confidence that the organic waste which they have transformed is being used in a beneficial way.”

COMPOST CONTINUES

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