Department of Primary Industries

primefact

Using recycled organics in banana farming

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What are recycled organics?

Recycled organics are a mixture of organics waste that have been processed (through mechanical and natural means) into a safe, usable product – compost. Sources of organics waste include tree branches and leaves, green waste and fruit and vegetable scraps. These products, once processed, are high in organic matter and can contain nutrients for plant growth and improve soil moisture and increase soil biological activity.

Potential benefits of recycled organics

Figure 1. Compost made from recycled organics

Recycled organics can provide nutrients to plants, stimulate beneficial microbes, improve soil structure, help the soil retain nutrients and increase water availability for improved plant growth. Additional organic matter can also reduce soil erosion and improve drainage and rainfall infiltration. Maintaining a healthy soil can lead to improved productivity and profitable horticultural production. Using recycled organics also reduces organics waste lost to landfill.

What to look for when purchasing recycled organics

There are different forms and qualities of recycled organics. Commercial compost made from recycled organics should be certified under Australian Standard *AS 4454-2012 Composts, soil conditioners and mulches*. This standard ensures the material is safe to use, has a consistent quality, is free from heavy metals, excessive glass and plastics, and not contaminated by plant or animal pathogens or weeds.

Non-certified organics should be avoided as they can contain contaminants or might not be safe for immediate application. You should select a product that is certified, comes with a laboratory report and addresses the limitations of your particular soil type. Talk to an independent agronomist about your requirements and which products might best improve your soil.

In NSW, the application of recycled organics onto land is regulated through resource recovery orders and exemptions. These set out the criteria for the safe production and application of the product. Growers are advised to ask the compost producer for the test results of material supplied to ensure that it meets all the chemical and other material requirements. Read The Compost Exemption 2016, available from the NSW Environment Protection Authority website.

In addition to state and federal government standards, the fresh-produce industry uses a food safety certification called Freshcare. Freshcare operates as a code of practice that gives users confidence that the material, when used correctly, will not affect product marketability. It references the Food safety and quality edition 4 (FSQ4) and to meet requirements, additives must be treated by an approved process with recorded evidence of compliance. For recycled organics, this includes sourcing from approved suppliers, time/temperature/treatment information, product composition, bacterial counts, batch IDs, withholding period (if any), certificate of analysis and batch-tracing capability.

Banana case study

Figure 2. The compost blower was mounted on an all-wheel-drive truck with the ability to reach most locations.

A case study on a banana farm in northern NSW investigated the effects of applying recycled organics to the soil. The compost was sourced from the Lismore City Council waste facility. This compost was certified and laboratory tested, had a pH of 7.9, a carbon–nitrogen ratio of 14:1, moisture content of 44%, particle size <5 mm of 89% and a range of useful nutrients. Soil and leaf samples for nutrient analysis and root samples for nematode analysis were taken at establishment and at the end of the trial; soil moisture was monitored throughout the trial. Banana mother plant and sucker growth was measured to determine if there were any production benefits. A demonstration site was also established in Coffs Harbour.

Application method

Figure 3. A wide-diameter hose could deliver compost up to 120 m from the truck.

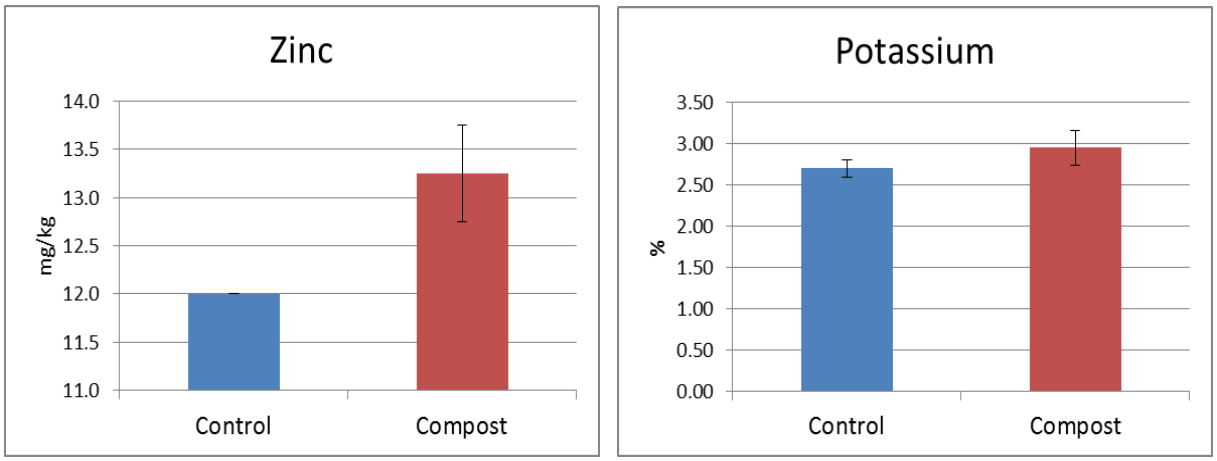
Compost was applied to the soil surface at the base of each banana plant using a commercial compost blower. Approximately 60 kg wet weight of compost was applied to each plant.

The trial site was relatively steep and the compost was applied through a hose from the blower, mounted on an all-wheel-drive truck, to a distance of up to 120 m from the truck. The hose, however, was quite heavy and required two operators to manoeuvre along rows and between banana stools. Delivering 60 kg of compost took approximately 90–120 seconds per plant.

Soil and leaf analysis

Soil tests taken before compost application indicated that the soil was quite acidic (pH 4.1–4.6), phosphorus levels were very high (>100 mg/kg Colwell), potassium levels moderate, calcium and magnesium levels moderate to high, and sulfur levels below optimal.

Figure 4. Leaves from the compost-amended plots contained significantly higher levels of potassium and zinc. Error bars represent a single standard deviation from the mean.



After 10 months, soil pH was 0.3 units higher on average in the compost-treated plots than in the control plots; however, due to high variation within the treated plots the increase was not statistically significant. Copper and iron levels significantly increased in compost-treated soils. Leaf samples collected at the end of the trial showed potassium and zinc levels were significantly higher from the composted plots than from the control plots.

Erosion control

Figure 5. After extreme rainfall, the compost remained in place preventing soil erosion. Banana roots could clearly be seen growing up and into the compost layer.

Over the 12 months of the study, several very heavy rainfall events occurred at the demonstration and trial sites. Two east-coast lows hit the demonstration site in Coffs Harbour with over 250 mm and 140 mm of rain respectively. At the Hopkins Creek site, over 800 mm of rain fell during a 24-hour period. Almost all the compost applied at both sites remained in place, preventing soil erosion. In plots where compost had not been applied, visible sheet erosion could be seen.

Banana roots were seen growing through the compost, which might have further helped stabilise the compost.

Nematodes

Samples were tested for six different species of plant-parasitic nematodes. Three species of parasitic nematodes, two soil-borne and one root-borne, had significantly lower counts in the compost plots than in the controls. However, there was a high frequency of zero counts across the site and the data should be viewed with caution.

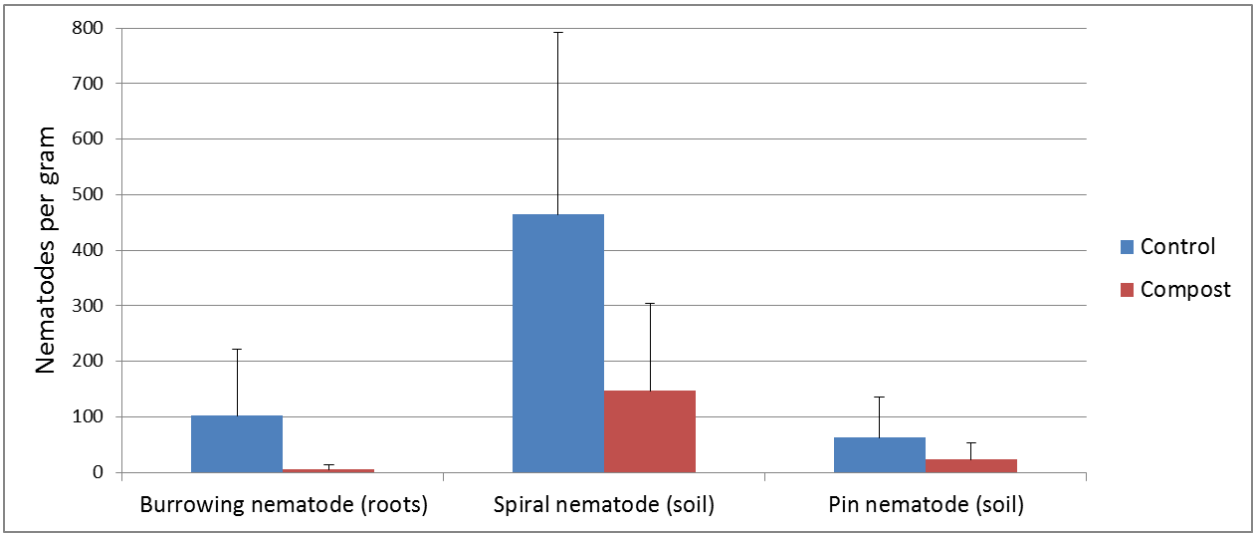
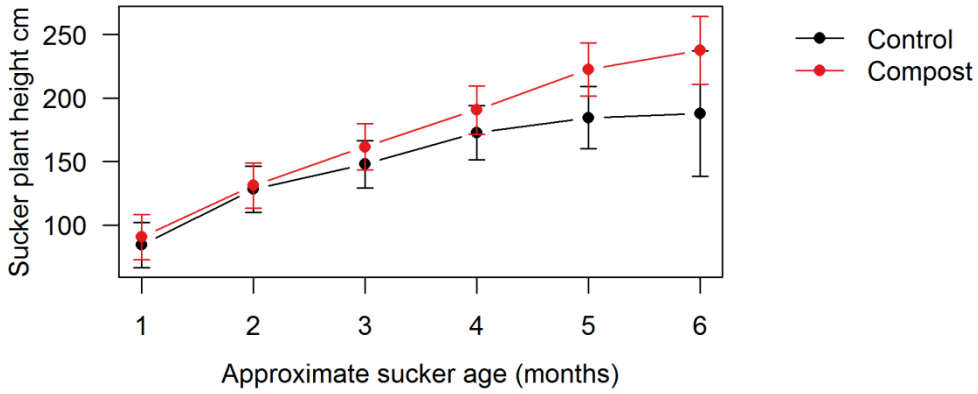


Figure 6. Plant-parasitic nematode counts were reduced for some species in the compost plots (burrowing nematode *Radopholus similis* (roots), spiral nematode *Helicotylenchus dihystera* (soil) and pin nematode *Rotylenchulus parvus* (soil). However further data is needed to confirm these trends. Error bars represent a single standard deviation from the mean.

Banana plant growth

Plant growth measurements were conducted approximately monthly from October 2016 to February 2017 and stools measured for height and pseudostem diameter. There was no difference in mother plant height and diameter, however, suckers that emerged during the trial tended to grow faster in the compost treatment than in the control. A longer trial would be desirable to confirm this trend through to maturity.

Figure 8. Banana suckers in the compost plots grew taller than in the controls. Error bars span the estimates ± 2 standard errors.



Conclusions

- The compost blower successfully applied the compost onto banana stools at a steep site with limited access. However, the method was relatively slow and manual labour was still required to position the heavy delivery hose.
- Compost applications significantly increased copper and iron levels in the soil and also potassium and zinc levels in banana leaves.
- Banana suckers grew significantly taller in the compost plots than they did in the controls.
- Some species of plant-parasitic nematodes appear to be reduced in roots and soils of compost-treated banana plants, however, further data is needed to confirm this trend.

- The compost remained in place through two torrential rain events, preventing soil erosion. The benefit of compost appears to be greater than just its nutritional value in that it could play a role in soil stabilisation on steep slopes.

More information

For more information about this project, please contact Matthew Weinert, phone number: (02) 6626 1352.

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