COMPOST & COMPOST TEA TRIAL: INCREASING ORGANIC BANANA PRODUCTION

The NSW banana industry (a sub-tropical region) is in decline because it cannot compete with North Queensland (a tropical region). This trial aims to show a significant increase in organic banana production in this region and to highlight the most efficient method to achieve this.

By GRAHAM TAYLOR

The reasons for the decline of the NSW banana industry are well documented - principally improved transport systems to the southern markets and higher yields in the tropics. Of secondary importance is the weevil borer pest and the "rootless bananas" syndrome of unknown aetiology.

There is a niche market for organic bananas grown using sustainable farming practices. The produce commands a premium price, however production costs are usually higher and the yield is lower.

Dr Elaine Ingham introduced the concept of the Soil Foodweb at a two day conference held at Coffs Harbour in March 2002. The Soil Foodweb Institute promotes the idea that increasing the beneficial micro organisms living in the soil will make the nutrients in the soil "plant available". The soils in NSW are low in organic carbon. The necessary micro organisms can be introduced back into the soil by using thermal compost and compost tea brewed from thermal compost. The compost adds organic carbon, fungal and bacteria foods into the soil along with the beneficial micro organisms.

This trial aims to use these methodologies to show a significant increase in organic banana production in this region and to highlight the most efficient method to achieve this.

HISTORY

The Taylor Family has been growing bananas for seventy years in the Coffs Harbour district and like most of the growers in northern NSW had been enticed by the large chemical companies into using soluble nitrate chemical fertilisers and copious quantities of pesticides and herbicides. Initially the yield increased and all appeared well. After some thirty five years, new diseases began to appear on the fruit, leaves and in the soil, which required more innovative and harmful pesticides.

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Today to grow bananas conventionally a greater range of pesticides is needed and extensive propping is required. This is against a backdrop of lower farm gate prices. The banana industry in northern NSW is not sustainable and has almost become non-viable.

The Taylor Family ceased using pesticides approximately ten years ago and has not used chemical fertilisers and herbicides for five years. A variety of organic methods have been tried with little success and there has been a huge reduction in production.

We are now committed to sustainable agriculture and are determined to develop a successful solution for growing organic bananas in northern NSW.

RATIONALE

The work undertaken by Dr Elaine Ingham and the Soil Foodweb Institute throughout the world indicates there are many more beneficial micro organisms in healthy forest and grassland soils than in most farm soils.

Healthy soil rich in biomass supports large forests. Trees prefer a soil which is extremely fungal containing up to 1000 times more fungi than bacteria. This does not mean there is no bacteria, there is just a lot more fungi as well.

> Soil tests show that the necessary minerals are present in the farm soil. The aim is to make these nutrients "plant available" through the activity of the myriad of micro organisms that live in healthy soil.

The aim of the trial is to introduce and produce a large diverse biomass into the soil which is fungal dominated, and this should suit banana production.

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About the author

Graham Taylor's family has been growing bananas in northern NSW for some seventy years.

This paper looks at composting solutions as a means of increasing organic production to maintain a viable business enterprise which can compete with the tropical production of Northern Queensland.

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ISSUES

Weed control

The plantation was replanted about ten years ago to allow tractor access in the bananas. The row spacing is 3 metres and the inter stool spacing approximately 2.5 metres. This spacing allows more light into the plantation floor which encourages more weeds and grasses to grow. The space immediately around the stools is covered with newspaper, trash and grass clippings and the remainder of the area is mowed regularly. We are in the process of reducing the inter-stool spacing to around one metre.

We are also experimenting with a thermal steam weeder. A winter crop of Woolly Vetch and a summer crop of Cow Pea are grown to fix nitrogen and help control weeds . This summer no crop was grown because of the drought.

Weevil borer *(Cosmopolites sordidus)*

The weevil borer beetle is a major problem in northern NSW because bananas grow more slowly in the sub tropical regions of Australia. The bananas cannot outgrow the damage the weevil borer larvae inflict on the corm. We remove the butts after harvesting the fruit and cut them and the stools into 5cm rings to use as baits. The baits are placed flat on the bare soil near to the stools in an endeavor to reduce the weevil population. The measures we employ to control the weeds and grass, namely placing trash and grass clippings around the stools, is not conducive to reducing the number of weevil borers.

Rootless bananas

Poor root systems in NSW banana plantations have been a problem for a quarter of a century. There are many theories as to the causes of "rootless bananas". Parasitic nematodes, soil pH, heavy fertilizing with potassium compounds, soil compaction, pesticide & herbicide residues and many other causes have been blamed for poor root systems however there appears to be no one cause.

Wind damage

Strong winds and mini cyclones are common on the north coast of NSW and cause a lot of damage to the banana plantations. Propping has become very common in an attempt to reduce the effect of poor root systems. Bananas with a good root system tend to break off rather than blow out by the roots.

Lack of water

Bananas love water - typically the equivalent of 140 mm rainfall per month in northern NSW. Unfortunately our trials have been conducted during one of Australia's worst droughts. ▶

TABLE 1 TRIAL INFORMATION

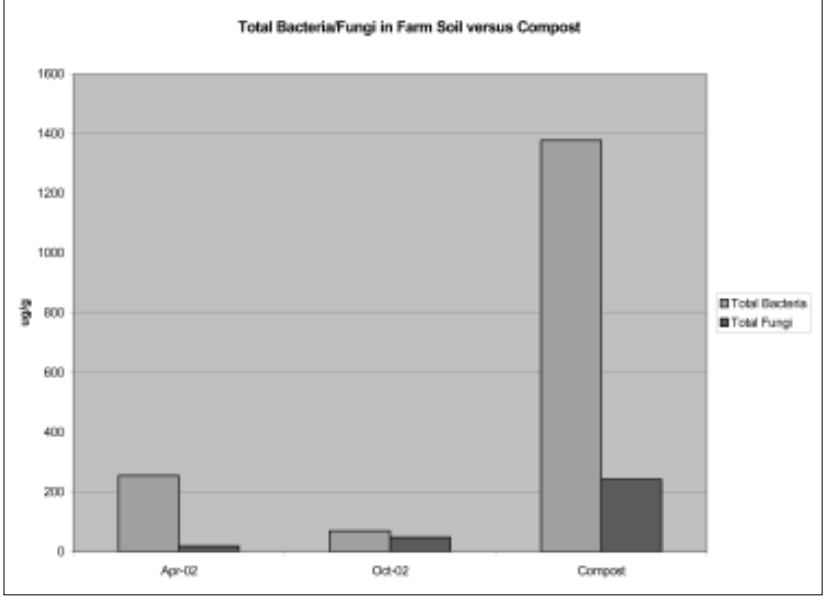


TABLE 2 TRIAL INFORMATION

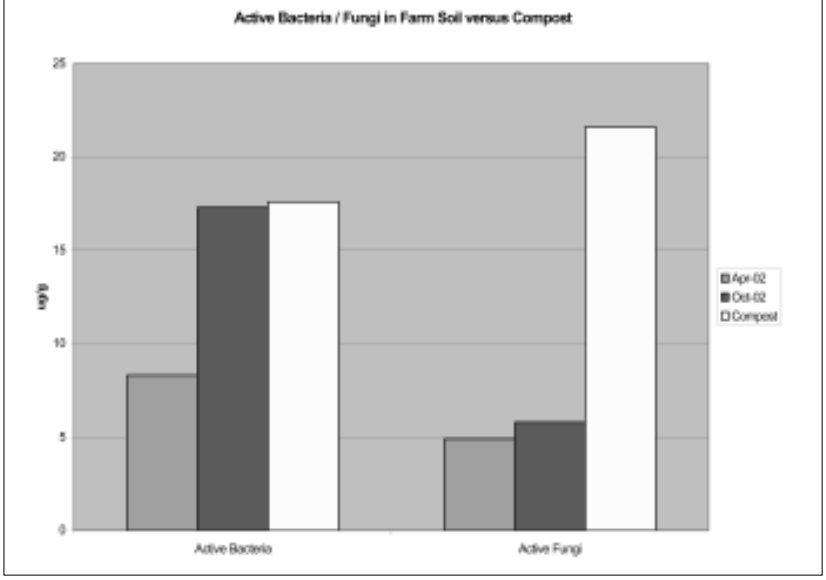
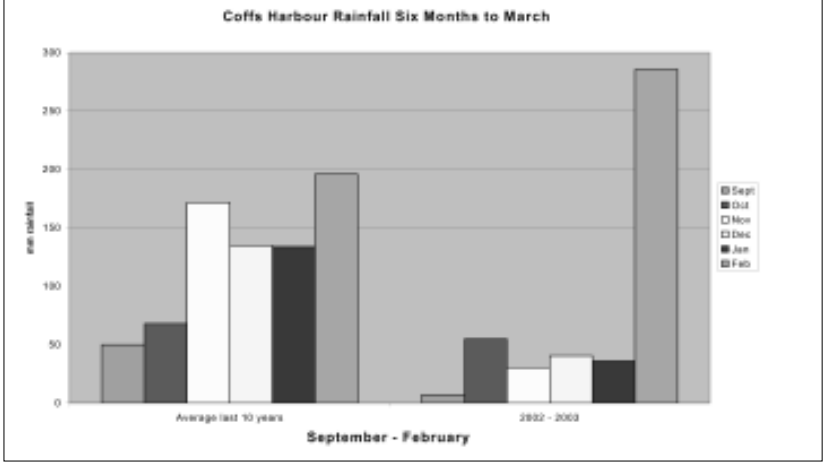


TABLE 3 TRIAL INFORMATION



METHODS

The plantation is divided into four sections. Each section comprises 10 rows with 32 stools (approx. 320 plants). The height of the mature plants was measured using a metre stick. The number of leaves, and fruit hanging were measured for each stool in the 4 sections. The missing plants in the rows were also recorded.

Section 1

COMPOST APPLICATION

Compost was spread over the soil area under the stools out to the drip line to a depth of 50mm. The compost was covered with newspaper, trash and grass clippings to help retain moisture and also to control the weeds under the stools.

Section 2

CONTROL AREA

No compost or compost tea was used except where new suckers were planted. Covering as in Section 1 used to suppress weeds.

Section 3

COMPOST TEA

Each stool group was surrounded by a ring of 4 to 6 holes approximately 25mm diameter x 150mm deep. The core holes were filled with compost tea (approx. 1 cupful). This section was also covered with newspaper and trash to aid weed control. This section was drenched with compost tea twice a month during the trial period at the rate of 150 litres per hectare.

Section 4

COMPOST TEA

This area was foliar sprayed or drenched with compost tea twice a month during the trial period. 150 litres per hectare were used. Trash was deployed around the stools to help control weeds.

All sections were mowed regularly inter-row and between stools in order to control weeds and grass and provide material for green manuring.

All the sections were fertilized in January with Natra Min natural rock 400Kg per hectare. The entire plantation had an application of compost in July 2002 around the lead sucker at a rate of 5L per plant. ▶

TABLE 4 RESULTS

Taller and Faster Growing Plants

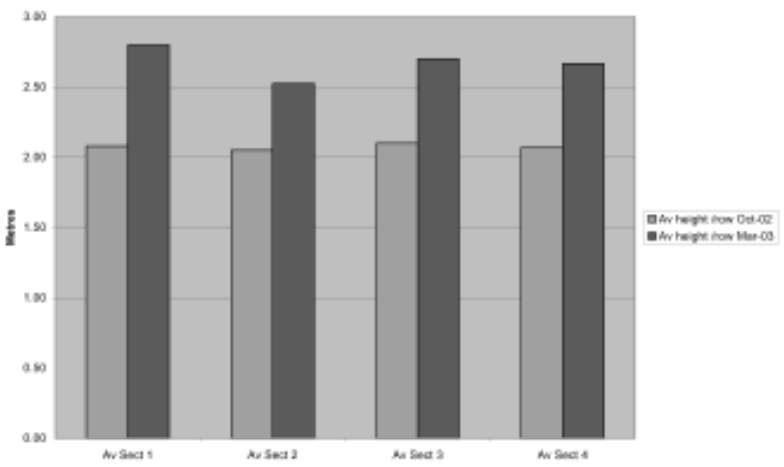


TABLE 5 RESULTS

Average Height and Leaf numbers all Sections

Section 1 Compost 50mm Deep to drip line

Average height October 2002	Average height March 2003	Percentage Increase	Average No. Leaves	Average No. Leaves	Percentage Increase
2.08	2.80	34.60%	5.57	10.39	86.53%

Section 2 Control No Compost & No Tea

Average height October 2002	Average height March 2003	Percentage Increase	Average No. Leaves	Average No. Leaves	Percentage Increase
2.05	2.53	23.40%	5.77	8.93	54.76%

Section 3 Cores 100 mm filled with Tea

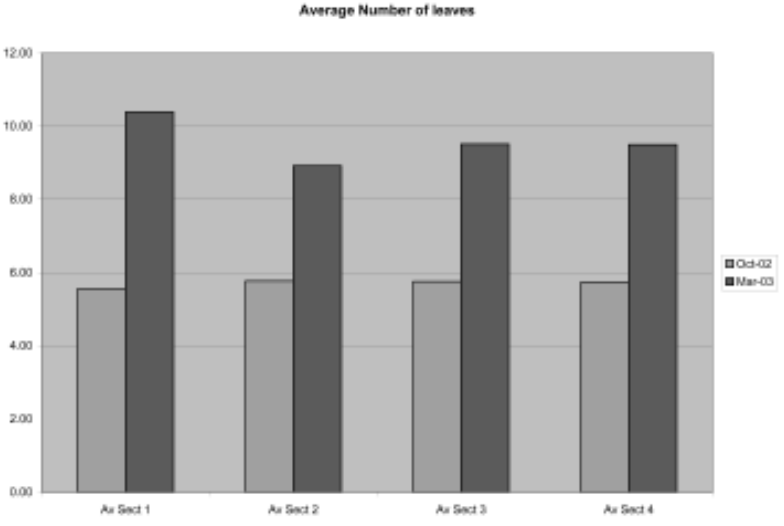
Average height October 2002	Average height March 2003	Percentage Increase	Average No. Leaves	Average No. Leaves	Percentage Increase
2.10	2.70	28.60%	5.76	9.51	65.10%

Section 4 Compost Tea Sprayed as Drench & Foliar

Average height October 2002	Average height March 2003	Percentage Increase	Average No. Leaves	Average No. Leaves	Percentage Increase
2.07	2.68	29.40%	5.74	9.51	65.50%

TABLE 6 RESULTS

Larger Leaves with Increased Numbers per Stool



THE PLANTS ARE THROWING LARGER BUNCHES

CONCLUSION

The plants surrounded by compost to the drip line grew the most 34.6% taller and 86.5% more leaves

The plants that were surrounded by core holes drenched with tea (28.6% taller) showed no improvement over the section applied with compost tea as a drench (28.9% taller).

The control section also grew 23.4% taller and 54.7% more leaves. Some of this improvement can be attributed to the compost applied in July 2002

Plants that were more than half developed showed less improvement than younger plants. The suckers in sections 1,3&4 increased in numbers and grew more vigorously than those in the control section. The suckers that were replanted into compost and compost rich soil grew exceptionally rapidly with a well developed root system.

Section 1, compost applied, showed a 3 fold increase in total fungal biomass and a 10 fold increase in beneficial nematodes which suggests the soil foodweb is beginning to work again in the old banana plantation soil. A greater increase in the biomass may have been observed during the trial period if we had experienced average rainfall October to March instead of the drought.

While replanting within the plantation, using a post hole digger, we noticed a compacted layer of soil approximately 250 mm below the soil surface in most areas of the plantation.

The results thus far show encouraging signs that the soil foodweb is beginning to work and to make the minerals and nutrients in the soil "plant available".

During April 2003 we will apply compost around the banana plants in sections 3&4 similar to section 1. Throughout the next 12 months we will apply compost tea as a foliar spray or as a drench to sections 1, 3 & 4. Section 2 will remain our control.

RECOMMENDATIONS

New plantings should be placed in holes 600 mm deep filled with compost. Do not plant the suckers too deep 150-200 mm should be sufficient. Use a post hole digger to create the holes. The roots will grow down into the compost.

Apply compost around the plants if practical. Compost tea applied as a drench is an efficient method to introduce beneficial micro organisms back into a plantation.

Consider removing half of the banana crop, deep rip the soil along the contour lines to break up any compacted layer then apply compost followed by replanting. The recovery time may be less then working with existing plants if they are unhealthy.

The income generated from conventionally grown half of the plantation will help financially during the transition.

You need to consider feeding the organisms in the soil NOT the plants. The bacterial and fungal predators can make 200 Kg - 400Kg per hectare of nitrogen and other nutrients available to the plants.

ACKNOWLEDGEMENTS

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REFERENCES

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