

# **Disposal of organic kitchen food waste in the Canterbury/Christchurch region of New Zealand with an EM-Bokashi composting system**

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## **Abstract**

One of the most challenging problems facing the composting industry today is the collection and disposal of putrescible waste from both domestic and commercial sources.

In this study 100 domestic households, were introduced to the EM-Bokashi composting system. They were all asked to complete the whole process twice (fill bucket and ferment), and the fermented product dug into the garden, with assessment of the buried waste for further decomposition after 28-30 days.

Minor problems occurred with the imported buckets due to leaks and breakages, and some other minor composting problems were reported. All participants agreed that the system was easy to use.

The system was new to New Zealand and it was unknown whether it would be suitable for the cooler Canterbury/Christchurch environment. The experiment showed that the EM bucket system had a potential to successfully dispose of putrescible waste in New Zealand. Although climate was thought to be a potentially limiting factor in Christchurch and the Canterbury region, the system worked well with kitchen waste vanishing in about four weeks following burial during winter months.

Keywords: composting, urban, putrescible, fermentation development

## **Introduction**

Kitchen organic waste is a significant portion of the waste stream and the aims of this trial was to study the potential of an EM bokashi bucket compost system for use in the Christchurch and Canterbury region. The disposal method of incorporating the food residue into gardens was checked. A previous trial to evaluate buckets and bucket size indicated that a 5 litre bucket system was suitable for households of 1-2 persons, and a 10 litre bucket system was suitable for a 3-4 person household.

## **Materials and Methods**

Christchurch City is situated on the east coast of the South Island of New Zealand with a population of approx. 370,000 in 130,000 households. The climate is temperate with cold winters and dry summers with an average rainfall of 630mm per annum. The city currently produces 230,000 tonnes of waste annually of which 35,000 of garden organics is currently being composted. The city operates a weekly kerbside collection of rubbish in black plastic bags of which 36% of the total volume is compostable kitchen organics. It is this fraction of the waste stream that the Council is currently investigating reduction solutions.

Participants in the trial were asked to volunteer after watching two live TV demonstrations on a local television network over a two-week period. One hundred applicants were then selected randomly and allocated the appropriate bucket size for their household.

Three different types of composting buckets were used. A 10 litre double bucket system with a pull off lid locally manufactured in New Zealand, a square 20 litre bucket with a pull off lid from Japan, and a 5 litre bucket with a pull out basket and twist top lid from Korea. EM Bokashi (Yamada 1998) was made locally using a bran and sawdust mix inoculated with Effective Micororganisms (EM). Each selected household was given a kit, which consisted of the selected bucket, a 4 litre bag of bokashi, an instruction leaflet and a sheet to record frequency, quantity and type of food composted. No further communication or advice was given to evaluate the customers understanding and clarity of the written material supplied. The trial occurred over an eight-week period during June and July with households reminded to return their recording sheets ten days before the end of the trial.

### Results and Discussion

Of the 100 households, 70 participants returned their recording sheets and 4 participants left the trial altogether. Structure of households is shown below in Table 1 with the type of bucket allocated.

Table 1. Structure of households

Household Details	5litre bucket	10litre bucket	20litre bucket
1Adult	19	10	0
2-4 Adults	11	20	9
2 Adults/2-4children	1	12	10
3Adults/1-4children	0	2	6

Table 2. Days taken to fill composting buckets first fill only

Number of days taken to fill buckets first fill only			
1-7 days	8 -14 days	15-21 days	over 22 days
14	30	15	11

A wide range of foods was composted. Examples of protein-based foods included cheese, beef stew, chicken, prawns, crabs, bacon and mince. Fruit and vegetable organics included beetroot, carrot mince from juicer, vegetable peelings, mushrooms, onionskins, fruit salad, and fruit peel. Also composted were buns and cakes, sandwiches, pasta and rice, coffee grinds and a bunch of flowers.

Table 3. Types of food organics composted.

Types of food organics composted			
Meats/fish	Vegetables	Fruit	Other
21%	42%	27%	10%

The amount of Bokashi used varied from half a litre per week up to one litre per week. The amount of food added to the bucket per day ranged from 0.75-3.0 litres. As trial participants were only contacted by mail or phone there was only their record sheets to analyse the results. This caused some degree of error in the results as individuals used different measurements to estimate food organics composted and bokashi used. Of the participants who returned their record sheets 98% of them liked the system and implied that they would carry on using it. A summary of comments was recorded

#### Positive comments

“Second bucket would be good to have while first is fermenting”

“Very happy with the system – baby worms in the garden where I dug my first bucket in – until now worms were rare in my garden”

“I have never had much joy with compost heaps so its good to find something that works for me”

#### Negative comments

“Stopper not tight on bucket –liquid leaks out”

“Bucket is difficult to separate and clean”(double bucket system)

The most popular bucket size was the 10 litre double bucket as it fitted under most kitchen sinks and was not too heavy to carry when full or difficult to dig into the garden, but problems occurred with the design including leakage, cleaning difficulty and lost bungs at the base.

All recorded pleasant odours or no odours at all describing the odours as vinegary, fermenting like beer, sweet alcoholic, and pungent but not smelly. A summary of descriptions of the general appearance of the food organics after fermenting for 7 days included, “mouldy”, “white spots”, “unchanged”, “dull”, “wet”, and “dogs dinner”! No one reported a problem digging the bucket contents into the garden but some commented that they would prefer to use just one bucket only and did not like to wait over the 7-day fermentation period when they could not use the system. On average, most food organics were taking up to 28-30 days to finish the composting process in the garden after burial with the rate of decomposition to the point where it vanished being variable due to location, soil type and fertility, and moisture. This was a longer period than reported elsewhere (Anon 1997f), and was considered a potential problem in our cooler Canterbury climate. The trial was done during the coolest part of the year (winter) and so a faster decomposition is anticipated over the warmer parts of the year.

The EM Bokashi bucket composting system had very good acceptance. Of the four participants who left the trial only one did not like the system the others left for either personal reasons or moving out of the district.

EMRO Korea (Bae 1994) have successfully promoted the system of EM bokashi composting of household waste in South Korea. The City of Pusan has adopted this system on a city-wide basis and over 5 years since first introducing the EM composting system now have 400,000 households using the system, and have significantly reduced their waste stream as a result. This example of a very successful system in Pusan has encouraged the authors to further investigate and promote this system for New Zealand.

### **Conclusion**

The EM Bokashi bucket composting system has the potential to reduce kitchen organics in the Canterbury and Christchurch regions and was a popular alternative composting system to use so encouraged ongoing participation. Its limitations are that it requires a reasonable size garden for the material to be buried in, which can be a problem for city dwellers. The problem of needing two buckets can be overcome by shortening the fermentation period to 24 hours but this is likely to lengthen the time for full decomposition in the garden. Investment is needed to develop a suitable bucket for New Zealand that will be cheap and economical. This may require a national marketing and distribution programme alongside the development of a Bokashi production plant. This scheme has the potential to be used on a national scale, as well as for incorporation into council kerbside recycling and compost operations.

### **References**

Anonymous (1997). EM Garbage Compost. In: Eco-Pure Magazine Special English Version 1.7.1997.

Published by EM Information Bureau .Japan.

Bae, Myung-chang (1994). Proceedings of Third Conference on Effective Microorganisms (EM) Held at Kyusei

Nature Farming Center, Saraburi, Thailand

November 1994

Yamada, K., Xu, H.L., Kato, S., Fujita, M., Katase, K., Umemura, H. (1998). Properties and Applications of an Organic Fertiliser with Microbial Inoculant Added.. In: Nature Farming and Sustainable Environment. Vol 1:13-25.13-25.