

Kerbside Collection of Domestic Kitchen Organics in Christchurch



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Executive Summary

This report investigates the feasibility of collecting domestic kitchen organics (food scraps) at the kerbside in Christchurch. It investigates the costs, operational issues and the community acceptance and participation in the system. It found that a small container used to collect kitchen organics would not negatively impact on the other “disposal” options for organic matter such as home composting, Council composting operations and commercial greenwaste collection. It found that a collection service which targets kitchen organics, collects material that is generally not composted and that would otherwise enter the landfill or wastewater treatment system. Based on these findings a trial collection of kitchen organics was performed.

Domestic kitchen organics were collected at the kerbside over an eight week period (May to July 2002), from two socioeconomically different areas in Christchurch (Fendalton and Burnside). Collection was weekly, on the same day as the refuse and recycling collection. Involvement in the trial was voluntary and each household received all the information and materials required for the trial. Each household received two buckets. One bucket was to place the kitchen organics directly into and could be kept in the kitchen. The other bucket was to store the kitchen organics throughout the week and was to be placed at the kerbside by residents for emptying on the collection day. Half the households in each area received biodegradable bags to line their kerbside bucket and half the households received EM Bokashi to help control odour.

The kerbside collection of kitchen organics was a resounding success. Those involved were overwhelmingly supportive of the service and were both willing to continue to use it, in its current form and were willing to pay for the service in the rates. Nearly all the household involved used the service on a regular basis and most noticed a reduction in the waste that they produced. The organic material collected was generally odourless, was relatively dry and free of contaminants. The biodegradable bags used, kept the kitchen organics well contained and kept the buckets clean throughout the trial. EM Bokashi minimised odours and the materials collected composted well in an open air windrow system.

The cost of a similar service city-wide in Christchurch was estimated at around \$1.5 million or \$140 per tonne. Such costs place this service in the order of the kerbside recycling service (\$160 per tonne, excluding processing costs) and the domestic refuse collection service (\$95 per tonne, including disposal). However, the costs also need to be weighed up against the economic and environmental benefits that such a service will provide. The benefits of diverting this material chiefly relate to the avoided landfill costs (\$84 per tonne), the reduction in costs associated with treating leachate and landfill gas, and the beneficial use of the material as a compost product. Taking these “savings” into account, the relative ease of the collection operation and the overwhelming public support from those involved, gives confidence in the viability of such a service in Christchurch.

Presented below, are the key results of the research and the recommendations based on these findings.

Key Results

- 23% of households volunteered to take part in the kitchen organics trial.
- 98% of people involved considered the service to be good or very good and 96% said they would continue using the service if it were provided.
- The Council collected 12 tonnes over the 8 week trial from around 320 households (average 5 kilograms per household per week). This result means that on average each household in Christchurch generate 208 kilograms of kitchen organics a year and city-wide equates to around 26,000 tonnes of kitchen organics.

- Overall participation was good 60% of households set out their kitchen organics for collection on each of the 8 weeks and 97% of households did so on more than 4 occasions.
- 88% of households noticed a reduction in the waste going to landfill, with 27% noticing a large or very large reduction in waste.
- Households with insinkerators were still interested in separating their kitchen organics for collection, but those that composted at home were less willing to participate in the trial.
- Overall the smell and contamination remained low throughout the trial.
- EM Bokashi was effective at reducing the smell and absorbing the moisture in the buckets.
- The biodegradable bags used were strong, remained intact and kept the buckets clean and the kitchen organics well bundled.
- The buckets were not interfered with by animals even when adjacent refuse bags that were attacked by animals.
- The 4 liter kitchen bucket and the 20 liter kerbside bucket were suitable size for most households.
- The kitchen organics and the biodegradable bags broke down (almost completely) after one week in an open-air windrow composting system.

Recommendations

- An enclosed processing facility for putrescible material should be established in Christchurch, so the material collected from a future kitchen organics collection service can be adequately processed.
- A kitchen organics collection trial should be performed during Summer to assess the impact of higher temperatures on the collection system and the impact of season on the amount of material collected and on the participation. This trial should continue for a longer time to allow those involved to establish a routine and to become totally familiar with the service. Lining the buckets (with biodegradable bags, paper or plastic bags) would be crucial for the collection service to be acceptable to the public. A future trial could test a range of lining options.
- The container design needs further consideration: a) the kitchen container should have a detachable flip-top lid to make it easier to place food scraps into it; b) The kerbside container needs to be wide and squat, it should have an attached flip-top lid and the container needs to be a distinctive colour to stand out from the other kerbside collection containers.
- Consideration should be given to providing a similar collection service to businesses for example, small cafes or outlets where kitchen organics are typically disposed of to landfill or enter the wastewater system . This should also be done in consultation with pig farmers who also provide another avenue for this material.
- Home composting should be promoted further to encourage people to take greater responsibility for the organic material that they produce.
- Support should be provided to commercial green waste collection services to maximise their uptake, as apposed to mixed-refuse wheeliebin collection services.
- Supermarkets and retail outlets should be encouraged to move towards degradable carry bags issued at the point of sale, as these can easily feed into a putrescible collection system.
- Overall, the collection system used was a success, with good participation and was highly regarded by those involved. The City Council should instigate a kitchen organics collection system in Christchurch as soon as budgets and processing technologies allow.

Key Words: waste minimisation, domestic kitchen organics collection, food scraps, food waste, wet organics, kerbside collection, composting, biodegradable bags, EM Bokashi.

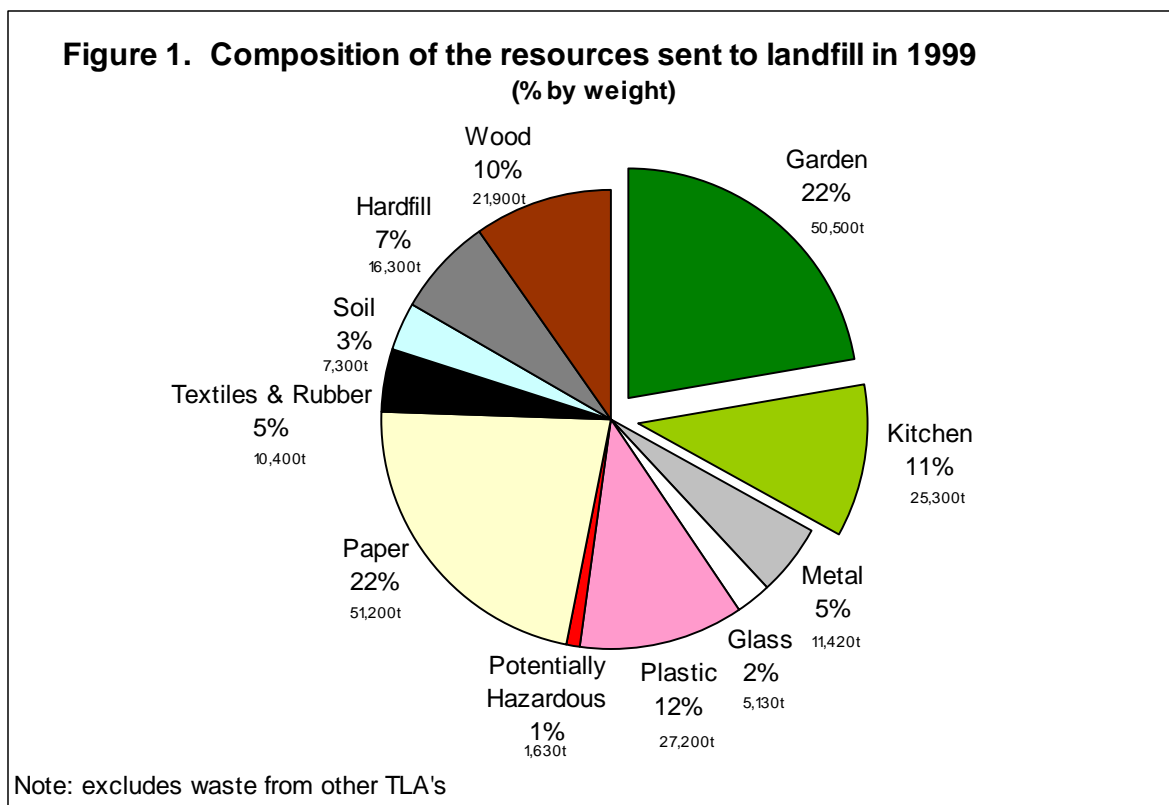
Table of Contents

1. INTRODUCTION	6
2. OBJECTIVES	7
3. BACKGROUND	7
3.1 THE BENEFITS OF MANAGING KITCHEN ORGANICS	8
3.2 COUNCIL STRATEGIC IMPERATIVES	8
3.3 COLLECTION OPTIONS FOR CHRISTCHURCH	11
4. HOW THE TRIAL WORKED	12
4.1 OVERVIEW	12
4.2 THE AREAS CHOSEN	12
4.3 GATHERING VOLUNTEERS	12
4.4 MATERIALS AND INFORMATION PROVIDED	13
4.5 FIELD MEASUREMENTS.....	14
4.6 COLLECTION	14
4.7 TELEPHONE SURVEY	14
5. RESULTS	15
5.1 FIELD MEASUREMENTS.....	15
5.1.1 <i>Participation</i>	15
5.1.2 <i>Smell</i>	16
5.1.3 <i>Moisture</i>	18
5.1.4 <i>Cleanliness</i>	19
5.1.5 <i>Suitability of buckets</i>	20
5.1.6 <i>Use of biodegradable bags</i>	22
5.1.7 <i>Use of EM Bokashi</i>	23
5.1.8 <i>Contamination</i>	24
5.1.9 <i>Lost buckets and missed collections</i>	25
5.2 TELEPHONE SURVEY	26
5.2.1 <i>Involvement and willingness to be involved</i>	26
5.2.2 <i>Likes, Dislikes and Improvements</i>	28
5.2.3 <i>Suitability of the kerbside bucket</i>	32
5.2.4 <i>Suitability of the kitchen bucket</i>	33
5.2.5 <i>Use of the Biodegradable bags</i>	35
5.2.6 <i>Use of EM Bokashi</i>	36
5.2.7 <i>Effectiveness of Instructions</i>	38
5.2.8 <i>Effect on household waste</i>	39
5.2.9 <i>Household situation</i>	43
5.3 PERSPECTIVES	44
5.3.1 <i>The collector (Onyx)</i>	44
5.3.2 <i>The composter (Garden City Composting)</i>	45
6. COSTS AND BENEFITS	46
7. CONCLUSIONS	48
8. RECOMMENDATIONS	49
9. REFERENCES	50
10. APPENDIX	51

1. Introduction

Organic waste entering the landfill is considered a priority for management in Christchurch because of the sheer amount of organic matter and its environmental impact. Organic waste is the largest component of the Christchurch waste stream totaling around 76,000 tonnes per year or 32% of the total waste going to landfill in Christchurch (Figure 1, Jarvis 2000). Garden organics make up around 51,000 tonnes of this, with kitchen organics making up around 25,000 tonnes. Organic matter breaking down in the landfill is also largely responsible for the production of leachate and the release of methane, a powerful greenhouse gas, into the environment.

The Christchurch City Council through Garden City Composting each year composts around 32,000 tonnes or 39% of the garden organics produced each year. The Council is looking to increase this by a variety of means, including through the purchase of an enclosed composting facility that will allow the composting of a greater range of organic material including kitchen organics (CCC 1999). Prior to such an investment the feasibility and social implications of collecting such material needs to be established and this study is part of that process. Consequently this report has adopted the following objectives.



2. Objectives

The objectives of this report are to investigate the feasibility of the kerbside collection of domestic kitchen organics in Christchurch. In particular, to investigate:

1. A collection system most suited to Christchurch;
2. The community acceptance of the collection system;
3. The likely costs and benefits of a city-wide service; and
4. Future courses of action.

To achieve these objectives this report firstly provides a background to the issue by considering the benefits of recovering kitchen organics from the waste stream, by outlining how this initiative relates to Council targets and by reviewing collection systems in operation elsewhere in the world. The report then describes the trial, the results and provides recommendations based on these findings.

3. Background

Before outlining the benefits associated with collecting kitchen organics it is important to be clear about what kitchen organics the Council is proposing to collect at the kerbside. Domestic kitchen organics includes food related items that are produced during the storage, preparation or consumption of food (Table 1). Kitchen organics commonly includes vegetable or meat trimmings, bone, fat, spoilt food and liquids. The Council is not intending to collect the liquid fraction of the kitchen organics (e.g. oils, liquid fats, sauces or juices).

Table 1. Examples of kitchen organics

Type	Example
Storage	Food that is spoilt during storage – rotten fruit or vegetables, moldy cheese and stale bread.
Preparation	Vegetable or meat trimmings discarded during the preparation of food – cauliflower leaves or stalks, orange or banana peel, bone, shell, and fat off cuts.
Consumption	Plate or table waste and leftovers discarded after consumption – cooked meat or vegetables, coffee grinds or tea bags and bones.

3.1 The benefits of managing kitchen organics

The source separation, kerbside collection and composting of kitchen organics provides new opportunities to address a number of social, environmental and economic objectives.

Such efforts can:

- Recover a resource from the waste stream and produce a useful compost product.
- Reduce the economic and environmental cost associated with the collection, transport and disposal of solid waste in the landfill, by diverting significant volumes of material to composting.
- Reduce the negative environmental effects associated with organic matter in the landfill, such as leachate and methane emissions.
- Reduce the quantity of material entering the wastewater system and lower the nutrient loading into the environment from the wastewater treatment plant.
- Provide a quality service and an alternative disposal option for material that is produced regularly by households.
- Provide an alternative disposal option for material that is seldomly composted at home (e.g. meat and bones).
- Provide an alternative disposal option for people who find it difficult to compost at home (e.g. not enough space to compost).
- Minimise problems associated with composting kitchen organics at home (e.g. odour and pests).
- Reduce the incidence of black refuse bags being interfered with by animals.
- Reduce the organic contamination of other recyclable materials (e.g. cans, glass and plastic).
- Promote an environmental ethic in the Christchurch community.

Taking kitchen organics out of the waste stream not only provides these benefits it fits with national policy and targets set by the Christchurch City Council.

3.2 Council strategic imperatives

The Council is determined to reach the targets set out in the Solid and Hazardous Waste Management Plan 1998. These demanding targets are:

That taking into account the real costs, the disposal of waste per person is reduced by:

- 65% of the overall waste stream going to landfill by 2020
- 80% of the domestic waste (domestic refuse bags) collected by the Council by 2010
- 90% of green and kitchen waste going to landfill, by 2010

(The base year for these targets is 1994)

The kerbside collection of kitchen organics will greatly influence the achievement of each of these targets and consequently is a priority area for action.

3.3 Collection systems elsewhere

The kerbside collection of domestically produced organic matter has been established in a variety of communities around the world. According to Perkins (2001) it is in its infancy in the United Kingdom, North America and Australia, adolescent in Nova Scotia and mature in Germany and Italy.

Germany

Perkins (2001) found the best precedents for the utilization of organic matter are in Germany, where waste diversion has increased from 10% to 80% in the last decade. Generally three 120 liter wheeled bins are provided to each household for the separate collection of 1) residual refuse, 2) inorganic recyclable material and 3) organic material. Collection is typically fortnightly although seasonal variations are common practice. Organic collection typically includes both garden and food waste and the collection frequency increases during the summer season to cope with increased volumes and to minimise odour problems. A 10 liter pail to transfer food waste from the kitchen to the larger wheelie bin is often provided.

Italy

In northern Italy an average of 55 – 80 kg of food waste per inhabitant per year was achieved through the separate twice-weekly collection of food waste in a small 10 liter container and biodegradable bag liner (EU 2000). 150 kg per inhabitant per year was achieved where food and garden waste were collected together in a wheelie bin (Facoino 2001). But it was recognised that this increase did not correspond directly to a decrease in waste to landfill as organic material was being diverted from home composting.

Based on the Italian experience, Facoino found collecting food and garden waste (wet and dry organics) separately, provided benefits because the collection services could be tailored to suit the nature of the material collected, seasonal requirements and individual composting processes could be established to avoid problems with hygiene, odour or costly processing (for example having to compost garden waste through a more expensive enclosed composting plant when open air composting will suffice). In addition, food waste collection trucks could be bulk slorries instead of compactor trucks because of the high density of the material, making collection cheaper overall.

In Italy 95% of Municipalities use biodegradable bags for food waste collection and others are abandoning the use polyethylene bags, primarily because of cost and quality. The use of plastic bags to collect food waste leads to plastic particles in the compost. To remove the plastic, extensive screening is required that results in considerable losses of the compost product and because the screening process cannot remove all the particles the compost is of lower quality. These problems were found to increase the cost per tonne of production and reduce the returns received for the end product.

Japan

In Japan microorganisms have been used to reduce odours produced from food waste and assist with the collection and processing of organic waste collected from households and industry. Dr. Higa Professor of Horticulture at University of the Ryukyus in Okinawa, discovered Effective Microorganisms (EM) in 1980 and released the findings in his book *An Earth Saving Revolution*. EM is a complex of cultured microorganisms that has been shown to possess a wide range of beneficial agricultural and environmental uses such as:

- A compost starter and accelerator;
- As a waste treatment and odour control formula;
- In the bioremediation of contaminated sites;
- In enhancing the nutrient availability of soils;
- To reduce flies and rodents from problematic sites and substances; and
- As a dietary supplement for humans and livestock (restores the internal microbe balance and reduces antioxidants).

Because of the multitude of uses EM cultures are now applied in 80 countries worldwide including New Zealand.

The EM culture specifically designed for the treatment of organic waste is EM Bokashi, which is a dried wheat-bran mix of microbes that is sprinkled over food waste collected in a small 20 liter container. EM Bokashi helps control odour from food waste and activates a composting process the results of which can be used as a liquid fertilizer and fed into a conventional composting process.

3.3 Collection options for Christchurch

The domestic collection system preferred internationally is three wheelie bins: 1) for the recyclable materials (paper, plastic, metals, etc); 2) for organic material including garden and kitchen organics; and 3) generally a smaller container for the residual refuse. This system could be adopted in Christchurch longer-term. However, there are some limitations in regard the collection of organic matter, that could influence its success in Christchurch.

Home composting of organic matter is the Council's preferred option and efforts to encourage home composting will continue. Other options available to residents for the "disposal" of organic matter include taking the separated material to the refuse stations for composting by the Council or by paying for a commercial (green waste only) collection service. A Council run organic collection service will detrimentally influence these other options.

A recent survey of Christchurch households (Moore, 2002) found that around 57% of people compost at home, that 40% of households use the Council's composting facility and around 15% have their garden organics collected commercially. Introducing a "free" (rates funded) Council collection service of organic material would greatly impact on the amount dealt with in these other ways. Such a service would maximise the organics the Council is required to process, increasing operating costs, while substantially reducing the income or material for these other existing options.

The same survey found that 60% of household dispose of their kitchen organics in either refuse bags or waste disposal units in the sink. This is reinforced by the fact that kitchen organics make up the single biggest component in the Council refuse bags (Table 2). It also found that kitchen organics were less likely to be composted or collected by the commercial services. Consequently the Council is looking to introduce a small container (20 liter) that focuses on collecting kitchen organics, that would normally be disposed of in the landfill or enter the waste water system. This smaller container would not be used to collect material (garden organics) that are commonly dealt with in other ways (i.e. home composted, dropped off for Council Composting or collected commercially).

Table 2. The composition of materials in domestic refuse bags and wheeliebins.

	Domestic Black Bag %	Domestic Wheelie Bin %
Kitchen	30	16
Garden	16	49
Paper	28	16
Plastic	10	4
Glass	3	3
Metal	3	2
Textiles / Rubber	4	2
Other	6	8
Total	100	100

4. How the trial worked

4.1 Overview

Domestic kitchen organics were collected at the kerbside over an eight week period (May to July 2002) from two areas in Christchurch (Fendalton and Burnside). Collection was weekly, on the same day as the refuse and recycling collection. Involvement in the trial was voluntary and each household received all the information and materials required for the trial.

Each household received two buckets. One bucket was to place the kitchen organics directly into and could be kept in the kitchen. The other bucket was to store the kitchen organics throughout the week and was to be placed at the kerbside by residents for emptying on the collection day. Half the households in each area received biodegradable bags to line their kerbside bucket and half the households received EM Bokashi to help control odour.

4.2 The Areas Chosen

The trial was performed in two areas in Christchurch, Fendalton and Burnside (see map Appendix 1). These areas were chosen because they are distinctly different (socioeconomically), yet close in proximity. Fendalton is one of the more affluent areas of Christchurch, whereas state housing is quite common in the less affluent Burnside area, as indicated by Pictures 1 and 2. The areas also fall in the Tuesday refuse and recycling collection area, which enabled the Council to prepare and respond to problems on the other days of the week. The Tuesday collection was also important because it allowed the kitchen organics to be composted and mixed in with the large volume garden organics dropped off at the refuse transfer stations over the weekend. Each area was divided in two and the households in each area were provided with either biodegradable bags or EM Bokashi as the map indicates.

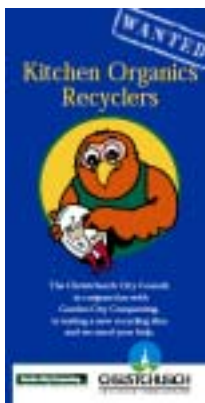


Picture 1. Fendalton



Picture 2. Burnside

4.3 Gathering volunteers



Picture 3. Flyer

Two thousand letters of introduction from the Mayor and promotional flyers (Picture 3) were mailed to selected households in the Fendalton and Burnside areas (Appendix 2 and 3). Both asked the residents if they would like to be involved in the trial and the flyer provided a free post way to reply. From this initial mail out we received around 200 replies from households interested in taking part. A follow up letter reminding the residents to reply was sent to the households that did not respond. This letter enabled the residents to reply over the phone and took the total number of households willing to participate to 475. Taking the overall participation rate to 23%.

4.4 Materials and Information Provided

The Council provided all the materials and information necessary for the trial to the households. The “starter packs” containing the materials were distributed by Onyx over the weekend (11/12 May 2002). In some cases during the trial households required additional containers because they were stolen and these were distributed as quickly as possible by Council staff.

All the household in the trial received two buckets:



- 1) A small kitchen bucket (4 liters, Picture 4) designed to be in the kitchen either under or on top of the kitchen bench to receive the kitchen organics. This bucket had a twist top lid, intended to make it easy to open. This bucket also had a sticker clearly stating what items to place in the bucket and what items to keep out (Appendix 5)

Picture 4. Kitchen Bucket



- 2) A large kerbside bucket (20 liters, Picture 5) to be kept in the laundry, shed or garage and to store the kitchen organics throughout the week. This bucket was placed at the kerbside by the residents each week and emptied by the Council. This bucket had a suction down sealable lid that stayed on even when knocked but came off easily, by lifting a tag on the side of the lid. This made it easy for the collectors and kept the animals or odour at bay. This bucket was labeled with the standard New Zealand food scrap label.

Picture 5. Kerbside Bucket

Households either received EM Bokashi or Biodegradable bags:



- 1) Half the households received bags of EM Bokashi to help control odour (Picture 6). The households were provided with instructions on how to use the EM Bokashi in the trial and were provided with additional information on what EM Bokashi is, how it works and what to do if there were any problems (see Appendix 4).

Picture 6. EM Bokashi



- 2) The other half of the households received biodegradable bags (Picture 7). These bags were made of cornstarch and were completely biodegradable. Toward the end of the trial the Council was kindly given an alternative degradable bag (plastic composite) to test. Instructions about the storage and use of the bags was provided (Appendix 5).

Picture 7. Biodegradable bag

All the information provided contained contact details (telephone, e-mail) and referred people to the website for additional information or help.

4.5 Field Measurements

Council staff took measurements at the kerbside each week during the trial (come rain, hail and snow – literally, Picture 8). The measurements taken were to gauge the household participation, hygiene, the suitability of containers (bucket and bag), the effectiveness of EM Bokashi, and the level of contamination. A summary of the measurements taken is provided below.

The measurements taken in the field:



Picture 8.
Measuring the
buckets

- Street name
- House number
- Bucket Weight
- Bucket Volume
- Was the bucket tipped over (yes – no)
- Insects present (yes – no)
- Offensive smell (on a scale of 1-5)
- Amount of liquid (on a scale of 1-4)
- Type of contamination (paper, plastic, metal, glass, twisty ties)
- State of biodegradable bag (intact, minor defects, major defects, totally rotten)
- Use of EM Bokashi (no EM, not enough EM, too much EM, not mixed in)
- State of bucket (washed or not washed/dirty)
- The total weight of kitchen organics collected by Onyx
- The weather at the time of collection

4.6 Collection

The kitchen organics were collected by Onyx in a sealed (water tight) refuse collection truck. The buckets were tipped into the back of the trucks and banged to knock out any loose organic material. The buckets were then placed back onto the person's property (as much as possible) to avoid buckets being stolen or knocked around on the street due to wind or animals.

4.7 Telephone Survey

A telephone survey (Appendix 7) was performed immediately after the collection trial finished. The calls were made by the Council, to participants during the evenings and in the weekends. Each household was rung back until an answer was received. A total of 316 households completed the survey.

5. Results

The results will be discussed under each of the two main sources of data: 1) the measurements collected in the field by Council staff; and 2) the results of the telephone survey.

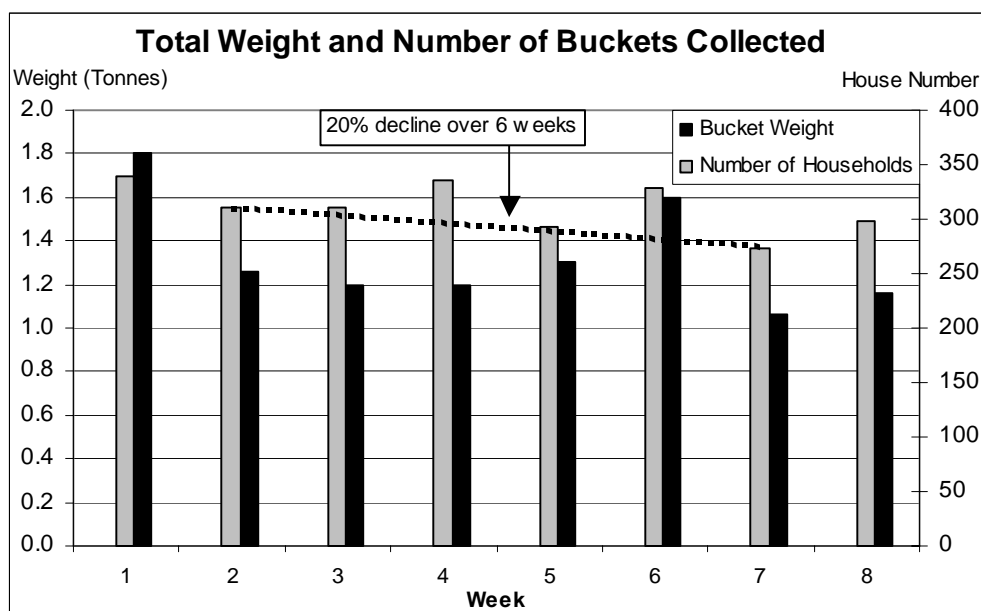
5.1 Field Measurements

5.1.1 Participation

Overall the Council collected 12 tonnes of kitchen organics from around 300 homes. The total number of buckets emptied over the 8 week period was 2490 buckets. Some households set out buckets every second week (8%) while most placed them out every week (87%). Roughly 20 households received buckets and decided not to start the trial. Another 14 households joined the trial during the first few weeks of collection.

The participation was highest in the first week, and then declined only slightly over the 8 weeks (Figure 2). In the first week, the amount collected was high because people had stockpiled their kitchen organics in the preceding week, in anticipation of the collection service commencing. The amount collected and the participation in week 6 was also high because residents were catching up after a snowstorm that occurred on the collection day in week 5. (Note that all other collection days occurred in fine frosty weather, typical of winter in Christchurch and would not have adversely affected the results). Residents were given a reminder that the trial was about to end during the last week and this would have boosted the figures for the last collection. So, excluding extraneous impacts (as just mentioned) the participation fell by 20% over 6 weeks (between weeks 2 and 7) for both areas. There was no difference in participation rates between the two areas indicating that a similar proportion in both socioeconomic areas would be willing to separate kitchen organics for collection.

Figure 2.

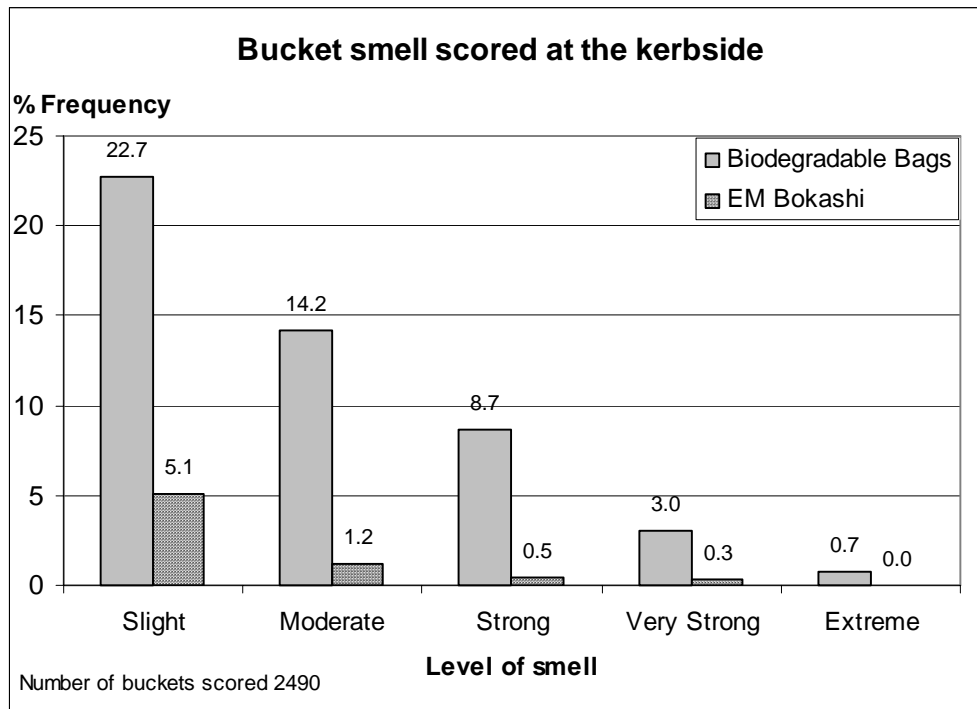


5.1.2 Smell

Overall the bucket smell scored at the kerbside by Council staff was very low over the eight week period. Around 74% of the buckets lined with biodegradable bags smelt only slightly or not at all and 98% of the buckets with EM Bokashi added smelt only slightly or not at all. It should be noted that some smells produced from the contents of the buckets, such as citrus or coffee, smelt strongly, but were not deemed offensive. Likewise, the yeasty-bread type smell of EM Bokashi was not scored as offensive (it was doing what it should), although some people may have found the smell disagreeable.

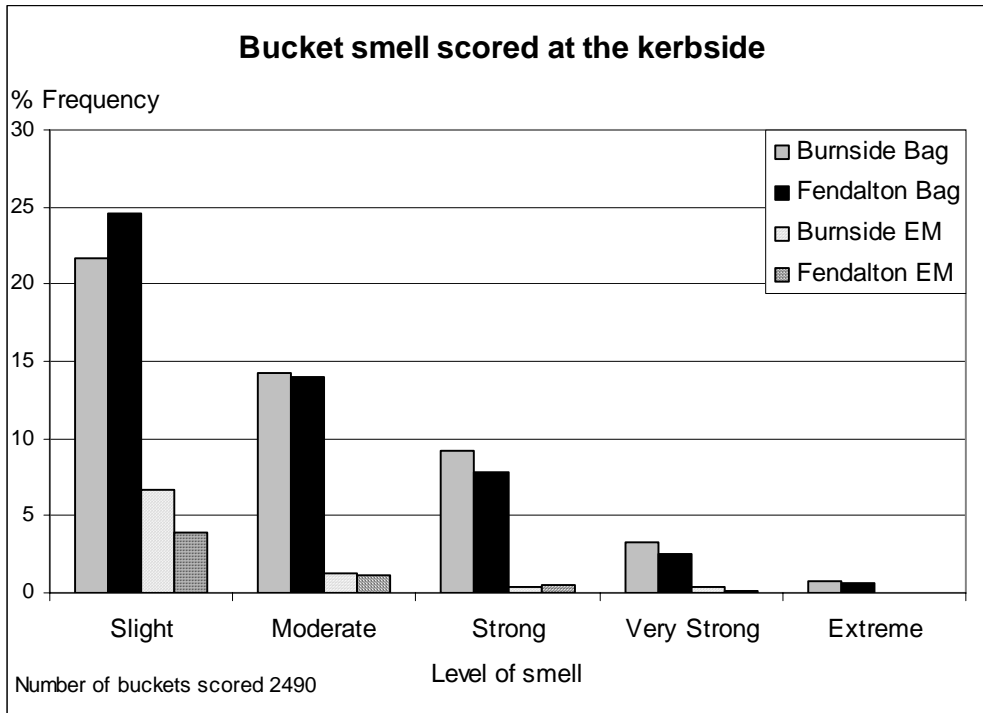
The addition of EM Bokashi significantly reduced the smell in the buckets as Figure 3 indicates. Only 2% of the buckets containing EM Bokashi smelt more than slightly compared to 26% for the biodegradable bag. Those buckets with a high amount of meat (particularly fish) and those buckets that were wet (from condensation or other liquids) tended to smell more strongly. EM Bokashi absorbed moisture in the buckets and so reduced the odour in this way, in addition to its microbial activity. Biodegradable bags tended to create more condensation in the buckets and consequently created more odour.

Figure 3.



Little difference in the smell was noted between the two areas (Figure 4), although buckets in the Burnside area tended to smell more strongly than in the Fendalton area. Overall however, the results indicate that socioeconomic differences have little impact on the smell of food scraps.

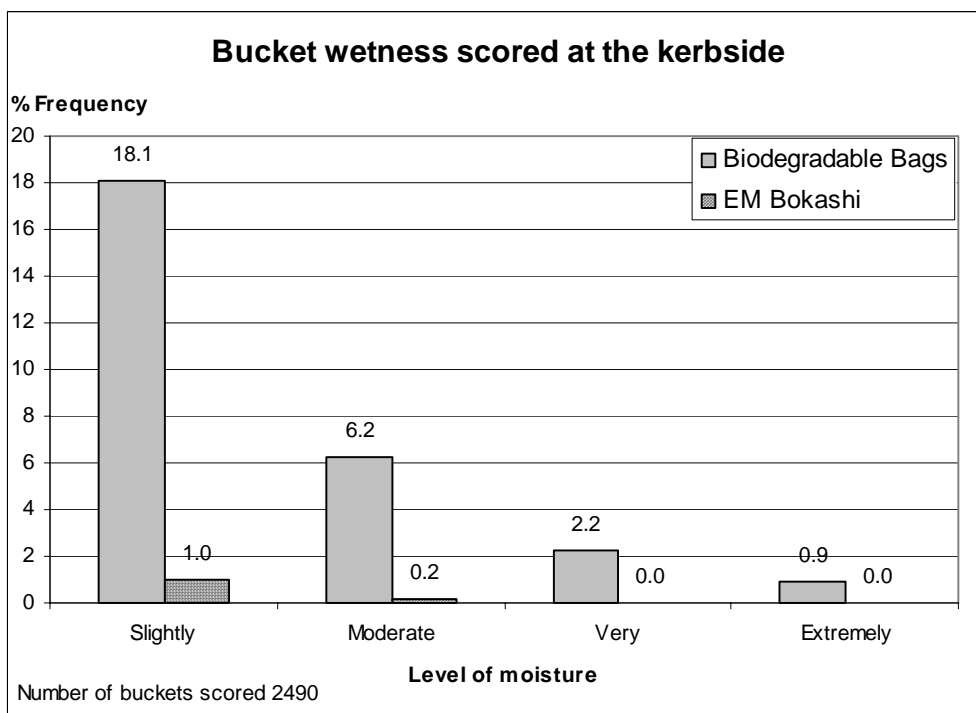
Figure 4.



5.1.3 Moisture

Overall the buckets placed at the kerbside remained dry throughout the eight week period. Around 90% of the buckets lined with biodegradable bags were only slightly wet or not at all and 98% of the buckets with EM Bokashi added were slightly wet or not at all. The EM Bokashi was effective at absorbing the moisture in the buckets as indicated by Figure 5. Only 2% of EM Bokashi buckets were recorded as wet, whereas 10% of those buckets lined with biodegradable bags were scored as moderately wet or more. From the field observations it was evident that EM Bokashi absorbed the “free water” in the buckets. This was aided by the residents placing handfuls of EM Bokashi in the bottom of the buckets and mixing the EM Bokashi in with the food scraps. In contrast, the bags prevented any liquid escaping and in some cases seemed to promote the formation of condensation inside the bucket.

Figure 5.



5.1.4 Cleanliness

At the start of the trial residents were asked to clean the buckets as required (see Appendix 4 and 5). The biodegradable bags that lined the kerbside buckets kept the buckets very clean and generally did not require any cleaning throughout the 8 week trial. As a result the cleanliness of these buckets was not scored. Households using EM Bokashi were not provided with bags and consequently these buckets required washing and were scored as “not washed” when they were obviously dirty and in many cases had mould growing on the side of the bucket (Picture 9 and 10).



Picture 9. Mouldy bucket

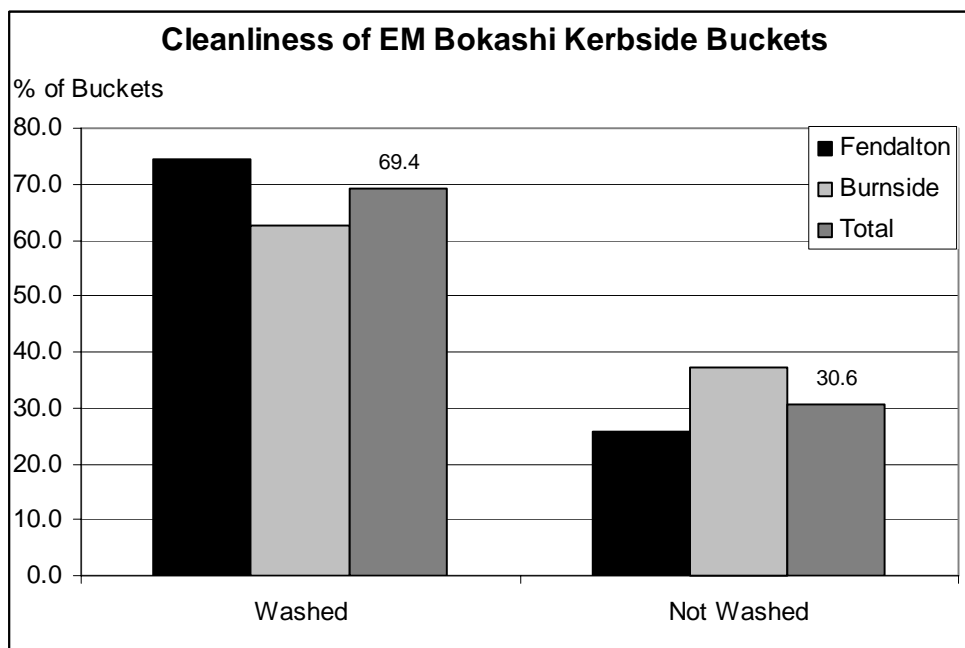


Picture 10. Mouldy bucket

The mould on the side of the bucket would have provided a source of “infection” for the kitchen organics placed in the bucket and so may have resulted in a greater level of odour than normal. The mould that grew was typically grey mould (*Botrytis*) and took several weeks to develop in the buckets.

Overall 30% of the EM Bokashi buckets were not washed (required washing)(Figure 6). Buckets in the Fendalton area tended to be cleaner (had more washed) than in the Burnside area.

Figure 6

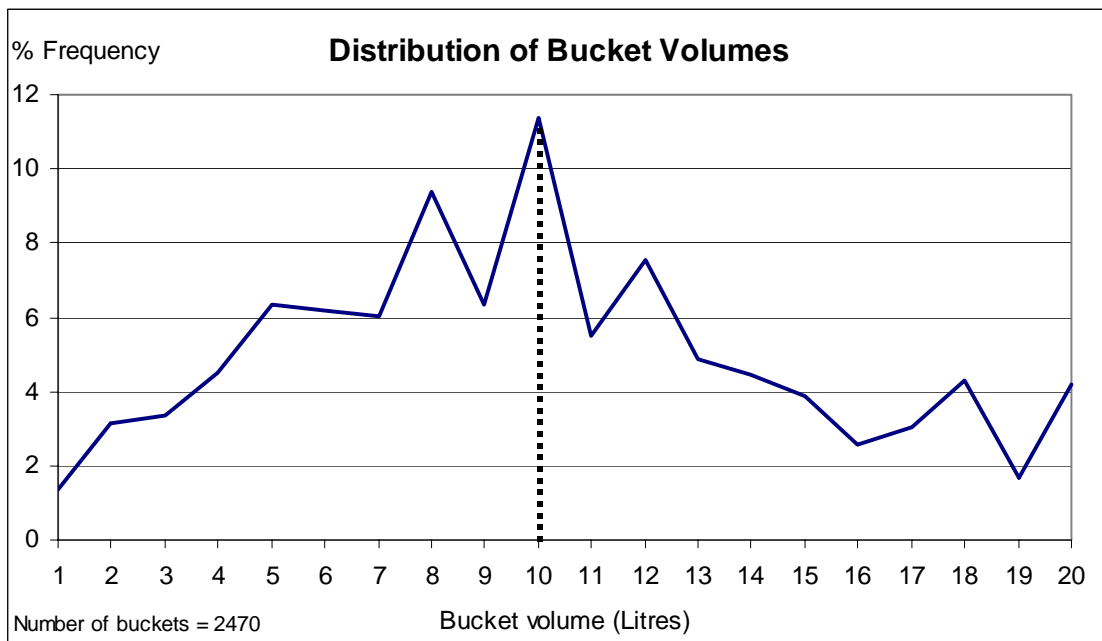


5.1.5 Suitability of buckets

Size

Overall the 20 liter buckets used by the residents were a suitable size, as the mean bucket volume scored at the kerbside by Council staff was half the bucket (10 liters) (Figure 7). Most of the buckets collected 51% were around half full (between 7 – 13 liters), with roughly 10% of the buckets being full (18 – 20 liters) and a further 10% nearly full (15-17 liters). This result would indicate that overall the bucket was a suitable size but additional buckets may be required to households in need. A second bucket was provided to 2 households during the course of the trial.

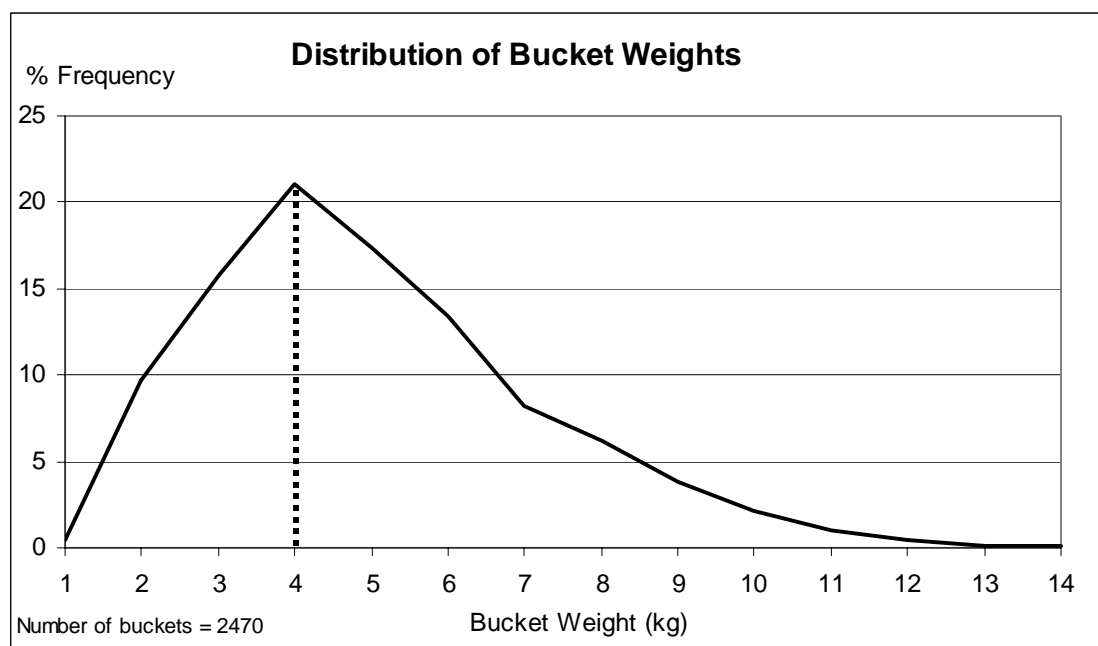
Figure 7.



Weight

Overall the buckets collected at the kerbside were easy to lift with a mean weight of 4 kilograms. Typically a full bucket weighed around 10 kilograms and half a bucket weighed around 5 kilograms. Nearly 70% of the bucket weights were between 3 and 6 kilograms. The weight of the buckets was strongly correlated with the level of moisture in the bucket and the fullness of the bucket..

Figure 8



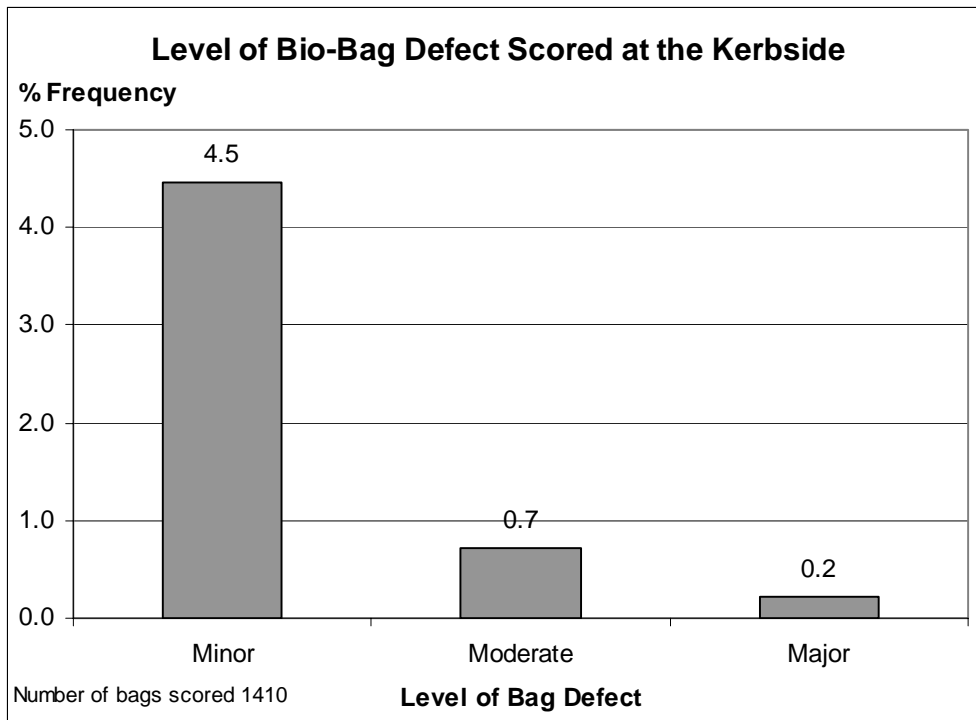
These results extrapolated city-wide would mean that the average Christchurch household would produce 208 kilograms of kitchen organics per year and for the city would total 26,000 tonnes of kitchen organics. These results compare well to previous waste analysis carried out by the Council (Jarvis 2000 and Moore 2000) where 25,300 and 25,600 tonnes respectively, has been estimated for kitchen related material entering the landfill.

5.1.6 Use of biodegradable bags

The BioCorp biodegradable starch bags used for the trial were found to be very strong and effective at keeping the buckets clean and the kitchen organics well contained. The bags were often tied at the top by residents leaving the buckets completely clean and free of any food residues when emptied (Picture 11). The bags were also very strong and could be lifted from the bucket easily, even when completely full (i.e. able to hold 10 kilograms of kitchen organics, Picture 12).

Nearly all the biodegradable bags (99%) in kerbside buckets were intact or had only minor problems (Figure 9). Minor problems were typically small punctures or slight tears (5 cm long) often caused by sharp items like bones in the kitchen organics or were caused by the inner edge of the bucket lid repeatedly rubbing on the bags when opening and closing the bucket. Only 1% of bags were found to have moderate or major defects. Such defects often resulted from the organic acids in the food or hot food, in some cases, starting to degrade the bag. Typically a section of the bottom of the bag was totally missing and this was often associated with high levels of moisture in the bucket.

Figure 9.



Picture 11. Bag tied by residents



Picture 12. 10 kilograms of food scraps

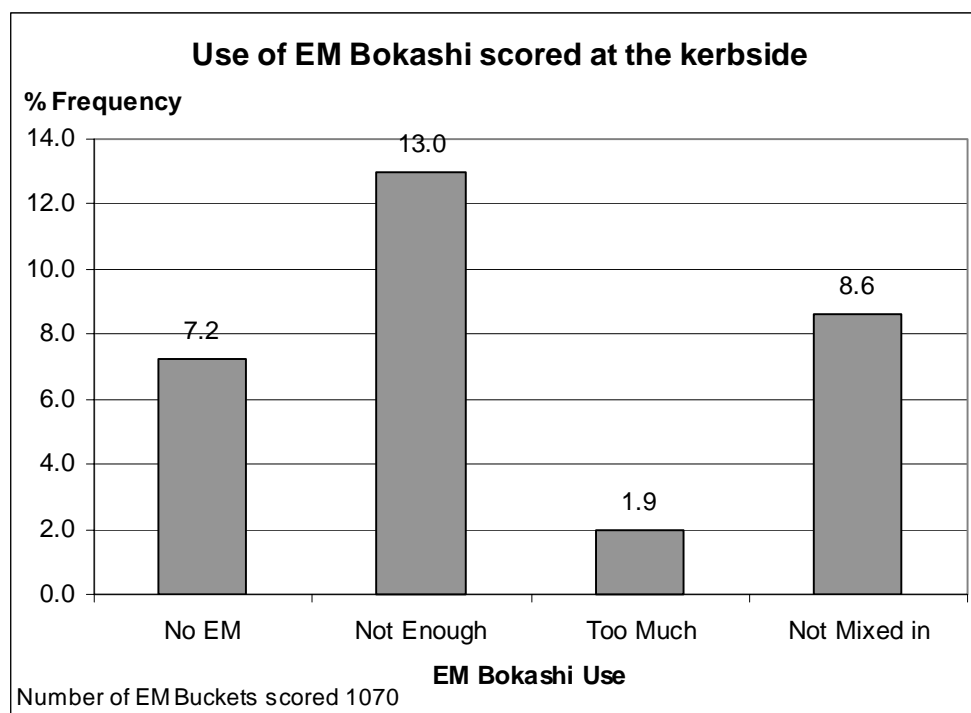
5.1.7 Use of EM Bokashi

EM Bokashi was found to be very effective at reducing odour and keeping the buckets dry. These results were achieved even when the use of EM Bokashi was not perfected by many residents. Residents were asked to place one handful of EM Bokashi in the bottom of the buckets each time they were emptied and to sprinkle it over the top as they added food into the smaller kitchen bucket (roughly three handfuls per small bucket) (Appendix 4). Most people (70% of the EM Bokashi buckets) did this successfully (Picture 13), however 30% of the buckets had difficulties with regard to the use of EM Bokashi (Picture 14).

The most common “faults” in the use of EM Bokashi were that not enough was added (13%) and that it was not mixed in with the food properly (8.6%) (Figure 10). In order for the microbes to work properly they need good contact with the food and need to be in sufficient quantity, especially when meat or fatty material is added. So the performance of EM Bokashi would have been adversely affected by the “faults” identified. These results can be attributed to a combination of factors: a) the kitchen organics in the buckets did not smell much, so people were not encouraged to use more EM Bokashi; b) the message of what to do may not have passed on effectively or been adequately taken up by the residents; c) it may have been too difficult or messy to use EM Bokashi in the way specified – a difficulty was expressed by residents about the ability to add EM Bokashi (see section 5.2.2); e) a build up of EM Bokashi in the bottom of the buckets meant that people were not adding any more EM Bokashi and f) people simply added EM Bokashi to the top of the bucket because they only remembered when it was time to put the bucket out for emptying.

Too much EM Bokashi was added predominately in the last week of trial when people were disposing of left over EM Bokashi.

Figure 10.





Picture 13. EM Bokashi well mixed in with the food



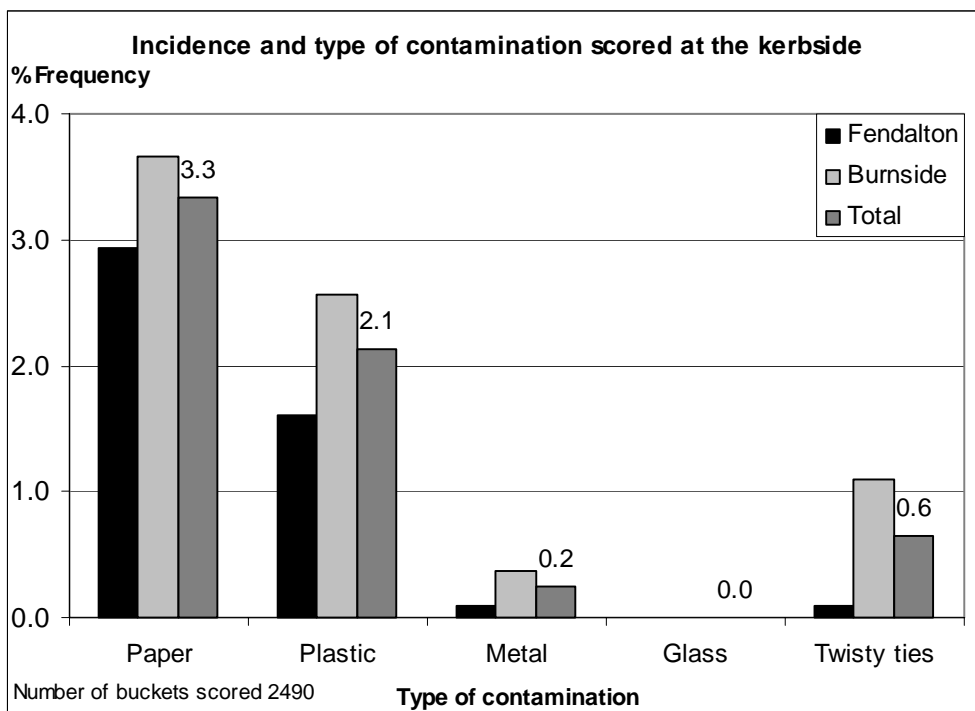
Picture 14. EM Bokashi left on top of the food

5.1.8 Contamination

The incidence of contamination scored at the kerbside by Council staff was very low over the 8 week trial. Paper was the most common contaminant found in buckets (3.3%) followed by plastic (2.1%) and twisty ties (0.6%) used to tie the bags closed Figure 11. The actual amount of contamination in each bucket tended to be small, apart from the notable exception of people lining their buckets or wrapping food scraps in newspaper. The presence of small amounts of paper was not considered a problem as it could easily be composted, whereas other materials (plastic or metal) occurring in a total of 3% of the buckets was not compostable. Plastic food-wrap and bottle tops were typical contaminants found in the buckets.

The incidence of contamination was higher in Burnside in comparison to Fendalton and overall the contamination got worse in the last few weeks of the trial.

Figure 11.



5.1.9 Lost buckets and missed collections

Over the eight week trial, buckets or lids were stolen or lost and some households did not get their buckets emptied. The occurrence of such mishaps was low overall and combined, affected around 6% of the households involved. Buckets were stolen from 3% of households and lids were taken or lost from a further 1%. Given that this was a new service (the buckets stood-out on the kerbside) and that the buckets were actually quite desirable for other uses, the loss can be considered very low. Likewise, the loss of bucket lids can be considered very low, given that the bucket lids were not physically attached to the buckets and made excellent Frisbees for children passing by.

Only 2% of households rang the Council to say that their kerbside bucket had not been emptied. A result that compares well to the 5% received from the telephone survey (Question 16) and means that overall the collection performed by Onyx was excellent. This was a good result given that: a) it was a new form of collection service both for Onyx and the residents; b) the collection route was new to the drivers; c) the households involved were quite dispersed within each area because involvement was voluntary; and d) the buckets were actually hard to spot because they were the same colour as the other collection containers placed at the kerbside (recycling crates and wheeliebins / MGB's)

5.2 TELEPHONE SURVEY

A telephone survey of the participants took place immediately after the trial was completed. This section describes the results of that survey in the order that the questions were asked to the residents. The actual survey is provided in Appendix X. It should be noted that many questions produced unsolicited answers (indicated by “*Don’t read out*”) thus the resident was not prompted for a particular response. The number of responses to each question is indicated by “n”. Comments relating to the results are indicated by bullet points.

5.2.1 *Involvement and willingness to be involved*

- Of those households that said they were willing to participate in the trial 7% or 24 households did not start the trial (Question 1). The main reasons given for not participating were because people thought it would be messy or unhygienic (13%) and that they didn’t feel it would be worthwhile because they did not produce much food waste (13%) (Question 2).

1) Was your household involved in this organic recycling trial ?

	n = 316	%
Yes		92
No		7

2) What was your main reason for deciding **NOT** to participate in the organics recycling trial ?

<i>Don’t read out</i>	n = 24	%
Too messy / smelly / hygiene		13
I don’t have much food waste		13
Already compost food waste		8
Have an insinkerator / waste disposal unit		4
I don’t have enough time		4
Other		17
	Total	100

- Most people (60%) became involved in the trial because they felt it was a good idea and that it would be good for the environment (Question 3). This is an encouraging result, because it not only shows the interest in such a service, but it shows that people are making the connection between what they throw out and the environment. They see that reducing waste has environmental benefits. The service was seen by 23% as a good way to reduce household waste and a further 7% thought that it simply made sense to join the trial.

3) What was your main reason for becoming involved in the kitchen organics recycling trial?

<i>Don't read out</i>	n = 293	%
It's a good idea or good for the environment		60
I want to reduce my waste		23
Composting makes sense		7
Wanted to see what it was about / curiosity		5
We have a lot of food waste		3
Thought I had to / I felt obligated		2
Other		1
	Total	100

- Overall 98% of the respondents thought that the kitchen organic service was good or very good (Question 4). This compares well with the current level of satisfaction with the kerbside recycling service (93%). However a greater portion felt that the kitchen organics service was very good (71% compared to 48%) in comparison to the recycling service. This shift can be explained by the fact that involvement in the trial was voluntary and so would not include the full spectrum of perspectives.

4) How good or bad do you think the kitchen organics recycling service was overall?

	n=293	%	Kerbside recycling satisfaction %
Very good		71	48
Good		27	45
No feeling either way		1	5
Bad		1	1
Very Bad		0	0
Don't know		0	0
	Total	100	100

- Most households (61%) put out their kitchen organics for collection each week throughout the trial and nearly all 97% put them out on more than half the collection days during the 8 weeks (4 times or more) (Question 5). The main reasons given for not putting the bucket out for emptying were that the people did not have much to put out (42%), they were away (33%) or that they forgot to do it (20%) (Question 6). These results indicate that a main hurdle for such a service will be getting people to put food scraps into the buckets in the first place, as those that remember to do it, will most certainly have enough to put out for collection each week.

5) Over the eight-week trial how often did you put out your organics bucket for collection?

Number of times	n=293	0	1	2	3	4	5	6	7	8	Total
%		0	0	1	2	9	3	10	14	61	100

6) What were the reasons, if at any time you didn't put out your organics bucket for collection?

<i>Don't read out</i>	n=110	%
Didn't have much food waste to put out		42
I was away / holiday / not home		33
Forgot to do it		20
Didn't have enough time		4
Couldn't be bothered		1
Other		1
	Total	100

- Overall people were very willing to continue with the SAME kitchen organic collection service, warts and all (96%) (Question 7). This is a very encouraging result and reflects the satisfaction with the service. There are many opportunities for improving the service further and such advancements will simply reinforce peoples enthusiasm for the service.

7) How willing would you be to separate your kitchen organics for collection, if the **CURRENT** kitchen organic service continued indefinitely?

	n=293	%
Very willing		83
Reasonably willing		13
No feeling either way		1
Not very willing		2
Not willing at all		1
Don't know		0
	Total	100

5.2.2 Likes, Dislikes and Improvements

- Overall people were very supportive of the organic recycling idea and trial, and had some good suggestions for improving the service. A complete list of peoples responses is included below with specific comments highlighted for discussion.
- **Likes (Question 8):** The most common response to being asked what people liked, was that the service was convenient, reliable and easy. Many people felt that they were doing something worthwhile and that it was a good way to help the environment. People also liked the fact that it reduced the waste they produced and "left more room in the refuse bags for other things". Indicating that a certain amount of substitution will occur with any waste saving service. Many people thought the service was "hygienic" (clean and odourless) and that it kept the animals out of the refuse bags. It is also worth noting that having the bucket system allowed people to better gauge the amount of waste they produced and left the recyclables cleaner for recycling.

8) What things did you like about the kitchen organics collection service ?

Simple, Easy and Convenient

Reliable and regular weekly service
The collection was the same day as rubbish collection

Clean and tidy disposal method

The kitchen organic service was a good idea
It was a good way to recycle organics

It was good way to help the environment

I felt that I was doing something worthwhile

It helped with my recycling – It kept the materials cleaner

The service meet my needs
There was no cost to use the service

It reduced the waste we produced

It left more room in the rubbish bags for other things

I used fewer rubbish bags
The weight of my rubbish bag was reduced
My wheelie bin was 1/3 less full
I didn't need to use my wastemaster

The buckets were a good size
The small bucket fitted nicely under the kitchen bench
Having sealable buckets was great
The sealable lid was a good fit
The sealable lid kept in any smells
The buckets were easy to handle and were light weight
I liked the colour of the buckets

Biodegradable bags were great
The biobags fitted the buckets well and kept them nice and clean
The biobags were very strong
I really liked the feel/touch of the bags – they felt organic

I learnt how much I wasted
It made me realise how much waste I produced
I did not have to throw out useful rubbish
I could dispose of things that I couldn't compost like meat and bones
It took all meat scraps

It didn't smell and was not messy

It kept animals out of the rubbish bags
I could put out my rubbish bag and not worry about animals
It reduced the bugs or animals getting into the compost bin
I didn't have to use my own compost heap

It was well planned, and executed
Ideal equipment and information
I liked the fact that the materials were provided
The organiser was very helpful and polite
I liked the clear labels on the bin, right in front of you

- **Dislikes (Question 9):** The most common responses to being asked what people disliked was that they “got sick of doing it” and that they had to take multiple loads to the gate. The most resounding negative feelings were towards the lid of the kitchen bucket. “It was hard to open with full or wet hands”. This issue would have to be resolved for a future collection to be successful. Interestingly, relatively few people thought that the service was messy or smelly, however, there was a great dislike for having to wash the buckets. This would indicate that liners for the buckets (e.g. biobags) would make the service more acceptable. There were also some problems with pouring the EM Bokashi on to the food scraps, from the bags supplied. This would need to be resolved, if EM Bokashi was to be used in the future. It is worth noting that the separation of food scraps was considered difficult for children to do. This could once more reflect difficulties in opening the kitchen buckets and perhaps the overall weight of the kerbside bucket.

9) What things did you dislike about the kitchen organics collection service ?

I got sick of doing it

It took time to do it

Trial should have gone on longer - please don't stop

I had to take multiple loads out to the gate

Too much double handling between the buckets, I preferred to put food straight into the green bucket

It was a bit difficult for children to do

It was a little messy and slightly smelly

It was difficult to separate food and sauces – keeping wet stuff out

The smell could be an issue - especially in summer

It was cold to go outside to empty bucket

Took organic matter away from our compost bin

The bucket was heavy

The buckets needed cleaning

The ridges in the little bucket made it difficult to clean

The twist top bucket was difficult to open - with wet hands or when hands were full

The bucket took up space in my household, I have limited space available

The collection needs to be earlier in the day

There was a big gap between the rubbish collection and the bucket being emptied

My bucket was missed for collection

I was concerned about the buckets flying away after they were emptied

Lids got blown around after the bucket was emptied

The bucket got knocked over

My bucket was stolen

Some biobags were totally sealed up – had no opening (faulty)

The bags made the food scraps sweat or get condensation badly

The biobags are not available in supermarkets – I would like to buy them

My EM storage bag split open

It was difficult to reseal the EM storage bags

The EM Bokashi was messy

EM Buckets need to be cleaned out properly when emptied (bang on truck to get everything out)

I did not like the smell of the EM Bokashi

The EM powder smelt very strong, I could smell it all over the house – not nice

I had to wash my hands after using the EM if they were wet

The kit I received was incomplete - the EM Bokashi information was missing

I would have liked more detailed instructions about what to put out

Everything was taken apart from bones

- **Improvements (Question 10):** Some great suggestions were offered by the residents to improve the kitchen organic collection service. Most notably were issues surrounding collection of more materials and the need to be specific about what is able to be collected. It was the Councils intention for this trial, to leave the range of materials (bones, shells, food-soiled paper etc) reasonably open, to assess what items people would put out for collection. A future service would need a more comprehensive list of items to make it clearer for residents.
- There were also a range of improvements suggested for the containers used. Predominantly, the kitchen bucket needed to be easier to open, a container able to pour out the EM Bokashi should be used and the kerbside bucket required a lock down lid or should be available in different sizes. The containers used for the trial were never visualized as being suitable for a city-wide service and were simply the best locally available for the purpose. A future service would require containers suited to our specific requirements (see section 8 for further details) and would be designed to overcome such concerns.

10) Do you have any suggestions for improving the kitchen organic collection service or the information provided to you ?

I would have liked more information about what happened to the material collected
 Greater description of the benefits of organics recycling
 More information on what to put in the buckets
 You should specify if bones or egg shells can be collected
 Ash from fires, vacuum cleaner bags and hair could also be collected
 Have a more detailed list please – do we include paper towels / tissues etc
 I could put in tea bags but not paper – this needed clarification
 Can we include dog doos too
 Make information on the storage of bags more prominent
 Information in other languages

Could have had an information sticker on the green bucket as well
 Put the address on the buckets so that they are not lost or stolen
 The buckets should have flip top lids to open more easily
 The kitchen bucket should have been a container that opens with a foot flap
 Use an ice cream container instead of the kitchen bucket – it would be easier to use
 The kerbside bucket should have a handle that locks down the lid
 A liner for the kerbside bucket is required

It would have been good to have more information on EM Bokashi
 We need a scoop for the EM bokashi
 The EM Bokashi needed a hard sealable plastic container with a pourer
 EM Bokashi would be good with a dispensing container like laundry powder boxes

Supply a fridge magnet too
 Magnetised onto fridge could be a small business card size info sheet
 Wheels on the kerbside bucket would be good
 The buckets were not big enough
 Have buckets to suit different sized households

I was unsure about closing the bags with something – should we use ties etc

Consistent times for collections
 Need to collect twice per week in summer

Use biobags for other collection services as well
 I would love to see the service continue
 Get it running for the whole city

5.2.3 Suitability of the kerbside bucket

- Most people (70%) stored the 20 litre kerbside bucket out of the house (Question 12). The most common place was the garage (34%) or simply outside (27%). This would no doubt impact upon the convenience, particularly during winter, of the service and the need or ease at which emptying the kitchen bucket will occur. Many of those households that kept the larger bucket inside, did so because they placed their kitchen organics straight into the bucket (to avoid double handling and to avoid frosty nights). The location of the bucket also has implications for the amount of condensation created in the bucket and possibly, the level of odour that may result (particularly in summer if the buckets are kept in direct sunlight). Buckets kept indoors will tend to be at more constant temperatures and be less prone to condensation and odour (EM Bokashi needs a relatively constant, moderate temperature to work effectively).

12) Where did you store the green **KERBSIDE BUCKET** during the week, before you placed it at the kerbside for collection?

	n=293	%
Garage	34	34
Outside	27	27
Laundry	22	22
Shed	7	7
Kitchen	5	5
Car-port	2	2
Pantry	1	1
Other	1	1
	Total	100

- Overall people felt the size of the kerbside bucket was about right (73%) and this reinforces the earlier result, where the average bucket volume was 10 litres or a half full bucket (Question 13). Nearly every resident interviewed (99%) considered the kerbside bucket easy to use (Question 14).

13) In general, was the size of the green bucket too big, too small, or about right to hold all your kitchen organics?

	n=293	%
Too big		18
About right		73
Too small		4
Don't know		0
	Total	100

14) How easy or difficult was the green bucket to use?

	n=293	%
Very easy		73
Easy		26
No feeling either way		0
Difficult		1
Very difficult		0
Total		100

- The emptying of the kerbside buckets was performed by Onyx and they performed this task superbly. Only 5% of the households had a missed collection during the 8 week trial (Question 16).

16) Was your green bucket not emptied by the Council at any stage during the trial after you had placed it at the kerbside for collection ? (*i.e. missed for collection*)

	n=293	%
No 94		
Yes 5		
Total		100

5.2.4 Suitability of the kitchen bucket

- Most people stored their small 4 litre kitchen buckets in the kitchen (82%) commonly under or on the kitchen bench (Question 17). This meant that there was a constant reminder to separate out the kitchen organics and that separation was as convenient and easy as possible. 13% of people did not use the container provided because they either placed their food scraps directly into the kerbside bucket or they already had their own container (commonly an ice cream container).

17) Where did you store the **KITCHEN BUCKET** with the screw top lid, which you placed food scraps directly into before transferring them to the green bucket?

<i>Don't read out</i>	n=293	%
<i>In the kitchen</i>		
On the bench		39
Under the bench		34
On the floor		5
In the pantry		2
Other (in kitchen)		2
Laundry / washroom		3
Garage / carport		1
Outside		0
Other		2
Did not use this bucket (straight into kerbside bucket)		13
Total		100

- In order for the kitchen bucket to be easy to use the Council considered that a suitable sized container would allow the residents to empty it once every two days or at the most once a day. These results show that the 4 litre container chosen is a suitable size to achieve this. Most people emptied the kitchen bucket once a day or once every two days (70%) (Question 18). This is reinforced by the fact that 85% of people considered this bucket to be a suitable size (question 19).

18) How often did you empty the kitchen bucket into the green kerbside bucket?

	n=275	%
Twice or more a day		7
Once a day		35
Every 2 days		35
Every 3 days		16
Every 4 days or less		3
Other		3
Don't know		1
	Total	100

19) In general, was the size of the kitchen bucket too big, too small, or about right to hold your kitchen organics?

	n=275	%
Too big		2
About right		85
Too small		12
	Total	100

- Most people felt that the kitchen bucket was easy to use (82%), however a considerable number (14%) found it difficult to use (Question 20). This was because as noted in the dislikes (Question 9), the twist top lid was difficult to open with full or wet hands. In the future the Council could suggest to the residents that they use their own containers (e.g. ice cream containers) or could consider providing containers with detachable flip-top lids. This would give people the option to use the lids or not, and would make the container easier to open for those who used the lids.

20) How easy or difficult was the kitchen organics bucket to use?

	n=275	%
Very easy		45
Easy		37
No feeling either way		3
Difficult		14
Very difficult		0
Don't know		1
	Total	100

5.2.5 Use of the Biodegradable bags

- Overall people considered the biodegradable bags to be easy to use (98%) and most (96%) had no problems with the bags over the 8 week trial (Question 23 and 28). A common fault that occurred, apart from the bags breaking down in the buckets, was that the bag opening was completely sealed up (i.e. a manufacturing fault). So taking the manufacturing fault out, the results reflect that the bags performed extremely well in the buckets. The bags did not become brittle in the frost (around -2°C or -3°C) and lasted well in storage.

23) In general, how easy or difficult was the **BIODEGRADABLE BAG** to use?

	n=170	%
Very easy		77
Easy		21
No feeling either way		1
Difficult		1
Very difficult		0
Don't know		0
	Total	100

- The buckets were kept very clean when the bags were used correctly. Most commonly the bag was folded over the rim of the bucket during use, then tied up or folded over when the bucket was set out at the kerbside for emptying. Most people 59% tied or folded over the top of the bag (Question 25).

25) Did you tie or fold over the top of the bag when you placed it out for collection?

	n=170	%
Yes		56
No		44
	Total	100

28) Did the biodegradable bag you were using tear, split or fall apart at any stage during the eight-week trial?

	n=170	%
Yes		4
No		96
Don't know		1
	Total	100

5.2.6 Use of EM Bokashi

- Most people found the EM Bokashi easy to use (91%) (Question 29). The 4% that found it difficult were predominantly concerned with the storage of the bags of EM Bokashi provided (the zip-lock bags did not always close and in some cases split open) and the difficulties associated with adding EM Bokashi to the food scraps (the bags provided were not easy to pour from). A small number of residents did not like the smell of EM Bokashi as noted in the dislikes (Question 9).

29) In general, how easy or difficult was the EM Bokashi to use?

	n=123	%
Very easy		54
Easy		37
No feeling either way		5
Difficult		3
Very difficult		1
Don't know		0
	Total	100

- Overall most residents (60%) thought the Council had provided them with too much EM Bokashi for the 8 week trial (Question 31). This response was understandable because most were not using enough EM Bokashi and points to the need for clearer instructions about how much to add.

31) Do you think the **amount** of EM Bokashi you were provided with was too much, not enough or about right for the 8 week trial?

	n=123	%
Too much		60
About right		35
Not enough		2
Don't know		2
	Total	100

- The next questions attempt to make a comparison between the smell and cleanliness of the buckets for households that used the biodegradable bags or EM Bokashi. Overall no difference in the smell was noted by residents for the kitchen bucket around 88% of people said that this bucket smelt only slightly or not at all (Question 32a). However, more residents thought that the kerbside bucket smelt more when EM Bokashi was used in comparison to the biodegradable bags. This result may relate to several factors: a) the EM Bokashi had a distinctive smell on its own, which people may have found disagreeable; and b) the bags could be sealed or folded over to keep in the odour. Either way, this result was contrary to the observations by Council staff at the kerbside (Section 5.1.2).
- The residents provided with biodegradable bags thought their buckets were considerably cleaner than those buckets that had EM Bokashi added. 90% of the residents that used biodegradable bags, considered their buckets to be slightly or not at all dirty, compared to only 47% for EM Bokashi (Question 32b). This difference was not expressed in the number of times people washed their buckets (i.e. no difference between EM Bokashi or biodegradable bags in Question 33). Even though the EM Bokashi kerbside buckets badly needed washing 70% of people still did not wash them. This has serious implications if a system is introduced that does not have a liner for the buckets. People did not seem willing to wash their buckets.

32) Can you please score the following, on a scale of 1 to 5

Where: 1 = not at all, 2 = slightly, 3 = moderately, 4 = strongly and 5 = extremely

	Area	Not at all	Slightly	Moderately	Strongly	Extremely
a) How smelly you thought the small kitchen bucket got	Bag	65	22	9	3	1
	EM	65	23	8	3	1
b) How smelly you thought the green kerbside bucket got	Bag	62	25	11	2	1
	EM	49	28	15	7	1
c) How dirty you thought the green kerbside bucket got	Bag	67	23	8	1	1
	EM	16	31	30	15	8

33) How many times did you wash or rinse the green **kerbside bucket during the 8 weeks**

Number of washes	0	1	2	3	4	5	6	7	8	Total
Biodegradable bags %	65	5	3	3	2	0	2	1	18	100
EM Bokashi %	70	3	3	1	4	0	2	1	16	100

5.2.7 Effectiveness of Instructions

- Overall most residents thought the instructions provided were understandable and that they received a sufficient amount of information (Question 35 – 38). This is supported by the relatively low number of households that called the council (10%). This figure can be considered low because nearly all of the calls received were operational in nature (e.g. buckets had gone missing or were missed for collection) and were not to clarify instructions.

35) Thinking firstly about the **LABEL** that outlined what items to place into the buckets, How easy or difficult to understand did you find the label?

	n=293	%
Very easy		71
Easy		26
No feeling either way		1
Difficult		2
Very difficult		0
Don't know		0
	Total	100

36) Now thinking about the **instructions** that detailed what to do during the trial How easy or difficult to understand did you find the instructions?

	n=293	%
Very easy		73
Easy		25
No feeling either way		0
Difficult		0
Very difficult		0
Don't know		0
	Total	100

37) Did you find the **amount** of information provided too much, not enough or about right to perform kitchen organic recycling?

	n=293	%
Too much		3
About right		90
Not enough		7
Don't know		0
	Total	100

38) Did you or anyone in your household telephone the Council at any time during the trial to seek help or clarification about the trial?

	n=293	%
Yes		10
No		90
	Total	100

5.2.8 Effect on household waste

- The kitchen organic service reduced the amount of material going to into black refuse bags or into commercial wheelie bins. 88% of households noticed a reduction in the waste going to landfill, with 27% noticing a large or very large reduction (Question 43). This observation is supported by the reduction in the number of black refuse bags placed at the kerbside each week during the 8 week trial (Question 40). 36% of those involved in the trial placed less than 1 bag a week out for collection, in comparison to 19% for a random sample of 300 Christchurch households. Those households that had commercial wheeliebin services tended not to notice the reduction in waste, to the same extend, than those households that used black refuse bags (i.e. waste minimisation efforts were more noticeable for households using black refuse bags).

40) Thinking about the time **DURING** the trial, how many black rubbish bags did you put out for collection each week

Number of bags per week	0	0.5	1	1.5	2	2.5	3	4	5
%	20	16	53	3	7	0	1	0	0
Random sample of 300 Christchurch households	9	10	66	1	9	1	3	0	0
%									

41) Do you have a regular commercial **waste** or **garden organics** collection service (e.g. a wheelie bin or drum for your waste)?

	n=293	%
No		60
Waste		27
Garden organics		10
Both		3
Don't know		0
Total		100

42) How often **DURING** the trial did your commercial collector pick up your wheelie bin or drum?

	n=117	%
Weekly		57
Fortnightly		15
Monthly		13
On demand		12
Other		3
Total		100

43) To what extent do you think the kitchen organics service has reduced the amount of waste you put out for collection, either in the black rubbish bag or in a commercial wheelie bin.

	n=293	%
No reduction at all		12
A small reduction		27
A moderate reduction		34
A large reduction		24
A very large reduction		3
	Total	100

- The kitchen organic service predominately collected material that would have otherwise gone into the waste stream. It was a concern for the Council that such a service would take material from home composting and so maximise the material required for processing by the Council. Only 16% of people said that they would have composted this material before the service was provided (Question 44). However, 81% of the people that composting at home, said that they would prefer to use the kitchen organic collection service instead of composting (Question 48). Indicating that such a service will collect material that could have been composted at home.

44) What would you have done with your kitchen organics **BEFORE** this trial ?

	n=293	%
Black rubbish bag		57
Insinkerator / waste disposal unit		17
Composted at home		16
Commercial waste collector		10
	Total	100

- More households involved in the trial had waste disposal units in the sink (insinkerators) than a random sample of Christchurch households (30% compared to 16%) (Question 45). This result largely reflects the more affluent area (Fendalton) in the trial. But it also indicates that households with insinkerators are still interested in separating their kitchen organics for collection. Further, it suggests that those with insinkerators acknowledge that putting food scraps down the sink is not the best use of this material and they are willing, on some level, to sacrifice convenience for environmental outcomes.

45) Do you have an insinkerator or waste disposal unit in your kitchen sink?

	n=250	%	Random sample of 300 Christchurch households %
Yes		30	16
No		70	84
	Total	100	100

- Most of the households (67%) that took part in the kitchen organic trial did not compost at home (Question 46). This is also supported by the shift from the “norm” in the proportion of home composting in the trial. This result was expected because these households already utilise this material and would not be as willing to use the collection service.

46) Do you compost at home ?

n=272	%	Random sample of Christchurch households %
Yes	33	53
No	67	47
Total	100	100

47) The next questions relate to the amount of composting you do at home. This includes worm farms and other composting techniques.

- a) How much of your **kitchen organics** do you compost at home?
 b) How much of your **garden waste** is composted by the **Council** i.e. taken to the refuse station for composting?
 c) How much of your **garden waste** do you compost at **home**?

n=111	a) Food waste	b) Council composting	c) Home composting
All of it	26	10	23
Most of it	20	6	22
About half of it	16	9	11
Some of it	27	40	33
None of it	11	34	11
Other	0	0	0
Don't know	0	0	0

48) If the kitchen organics collection service was provided to you indefinitely would you use the buckets rather than composting your kitchen organics at home?

n=135	%
Yes	81
No	7
Depends	10
Don't know	1
Total	100

- It was encouraging that 65% of the people involved were willing to pay for the service provided (Question 49). Such a service is anticipated to cost the Council around 30 cents per household per week and the results indicate that such an increase in rates would be acceptable to residents.

49) Which of the following best describes how much you would be prepared to pay extra in your rates each week for the kitchen organic collection service ?

	n=293	%
Not willing to pay any more		35
Up to 20 cents per week		15
Between 20 and 50 cents per week		20
Between 50 cents and \$1.00		13
Between 1.00 and \$1.50		3
Over \$1.50		2
Don't know		12
	Total	100

5.2.9 Household situation

50) Which of the following represents your household situation ?

	n=293	%
Household with the youngest child under 5		13
Household with the youngest child between 5 and 18		33
Household with no children		39
Student flat (e.g. University or Polytech)		5
Household where English is a second language		4
None of these (e.g. children at home over 18)		6
Total		100

51) Do you own or rent your home?

	n=293	%
Owned		75
Rented		25
Total		100

52) How many people altogether live in your household, including yourself, any boarders, flatmates and children?

Number	n=293	1	2	3	4	5	6	7	8<	Total
%		14	29	16	19	16	4	1	0	100

53) In which of the following groups is your total household income before tax per year.

	n=293	%
Up to \$20,000		12
Over \$20,000 and up to \$40,000		19
Over \$40,000 and up to \$60,000		17
Over \$60,000 and up to \$80,000		10
Over \$80,000		18
Don't know		17
Declined		8
Total		100

54) In which of the following age groups do you fall

	n=293	%
24 or under		8
Between 25 and 44		34
Between 45 and 64		37
65 or over		19
Declined		2
Total		100

5.3 PERSPECTIVES

5.3.1 *The collector (Onyx)*

- The weight of the buckets was fine but the buckets would not want to be any bigger because 10 kilograms for a single bucket was heavy enough for collection.
- The buckets needed stronger handles.
- The forest green kerbside buckets were hard to identify because they were the same colour as other collection containers on the kerbside (recycling crates and wheelie bins/MGB's Picture 13)
- The buckets were light weight and upright which could cause problems in windy conditions after they were emptied.
- The bucket lids must be attached to the bucket (flip lids) to avoid the lids being lost, stolen or dislodged by animals or wind.
- The biodegradable bags kept the buckets clean and the kitchen organic well bundled. It was easier and less messy to empty buckets with the biodegradable bags. In many cases the bags could be lifted out of the buckets and thrown straight into the trucks.
- It was hard to get all the material out of the buckets when they did not have bags (i.e. used EM Bokashi).
- Some of the bags and food caught on the inside of the truck when emptying the truck (Picture 14).



Picture 13. The kerbside bucket and other typical containers found at the kerbside



Picture 14. Tipping 1.2 tonnes of kitchen organics from the collection truck

5.3.2 *The composter (Garden City Composting)*

- The kitchen organics composted successfully, with no odour problems and no evidence of pests.
- The kitchen organics were mixed in thoroughly with additional EM Bokashi and partly composted garden organics (Picture 15). The kitchen organics were then layered into a windrow of garden organics for composting over a 4 week period.
- No visible kitchen organics or bags could be detected in the compost after 2 weeks of composting most of the material was broken down after only one week.
- The only evidence visible after 1 week of composting was bags that were knotted (Picture 16). During the mixing stage most of the bags were broken to avoid anaerobic conditions inside closed bags. Such conditions were considered to hinder decomposition. The incidence of closed bags was very small and was not considered a problem.



Picture 15 Mixing EM Bokashi into the kitchen organics



Picture 16. A knotted biodegradable bag after 1 week of composting

6. Costs and benefits

The total cost of the trial was \$39,130 (Table 3). The main cost elements were the containers and materials provided to the households (\$24,000), staff time (\$7,470) and the collection of the kitchen organics (\$5,390). It should be noted that more materials were purchased than were actually used in the trial (items were purchase for 600 households, whereas around 400 were used). Generally, because the Council could not be certain of the participation in the trial and because of the need for backup materials.

Table 3. Cost of kitchen organics trial

Description	Price per unit	Units	Total
Starter packs & delivery			
15 Liter bucket (kerbside)	9.00	600	5,400
2 Liter bucket (kitchen)	4.20	600	2,520
Biodegradable bags	0.88	4,000	3,520
Plus postage from Australia			875
Label buckets and deliver packs	5.00	600	3,000
15 liters of EM Bokashi @ 35 cents/liter	5.25	600	3,150
			18,465
Printing			
Graphic design			3,000
Introduction flyer (full colour)	0.29	2,000	580
Introduction letter (B&W)	0.10	2,000	200
Instruction card (full colour - card)	0.47	600	282
Instruction bucket label (2 colours - vinal)	0.80	600	480
Instruction flyer (EM & BioBag)	0.50	600	300
EM Instruction leaflet	0.50	250	125
Food scrap bucket label (White & Green - vinal)	0.80	600	480
Feedback flyer (full colour)	0.30	600	180
			5,627
Mail			
Envelopes & labels	0.40	2,000	800
Two mail-outs	0.30	4,000	1,200
Return mail	0.30	600	180
			2,180
Collection costs			
Collection cost per household	8.30	560	4,648
Sealing collection truck			540
Equipment for field measurement			200
			5,388
Council Staff Time @\$13 per staff hour			
Field measurement	13.00	160	2,080
Telephone survey	13.00	240	3,120
Analysis and report writing	13.00	105	1,365
Complaints and service	13.00	38	488
Composting staff time	13.00	32	416
			7,469
TOTAL			39,129
BUDGET 2001/02			45,000

Note: The trial was established for a maximum of 600 households

If the trial was to be run again some cost cutting methods could be considered:

1. The starch biodegradable bags could be replaced with degradable plastic polymer bags which are considerably cheaper (around 6 cents per supermarket sized bag) and still break down in the composting process. However, further research would be required into the impact of any residue in the compost.
2. The EM Bokashi could be optional for households willing to pay for the additional odour control benefits. Although, the appropriate container should minimise any odour concerns.
3. Households could provide their own KITCHEN container (e.g. ice cream containers) and the Council could simply provide labels / stickers for these containers.
4. The field measurements could be minimised by asking participants to take note of key measures throughout the trial (odour, participation etc) and gathering this data through a telephone survey.

If a similar system was rolled out Christchurch city-wide (using the assumptions noted below Table 4) a rough break down of the operational costs would be around \$140 per tonne for collecting and processing the material (Table 4). Such a cost would place this collection service in the realm of the domestic refuse collection costs (around \$98 per tonne in 2002/03 for collection and disposal) and the kerbside recycling costs (at around \$160 per tonne for kerbside collection only). Obviously, by increasing the participation rate and by collecting more material per household these costs would be reduced on a per tonne basis.

Diverting the organic material from landfill has considerable economic and environmental benefits and such a system should be weighed up in light of these benefits. The benefits of diverting this material chiefly relate to the avoided landfill costs (proposed to be \$84 per tonne), the reduction in costs associated with treating leachate at the landfill and the beneficial use of the material as a compost product. Taking these “savings” into account gives confidence in the viability of such a service.

The cost of a kitchen organic collection service would need to be off set by the revenue generated by the proposed waster pays system for domestic refuse collection and potentially the capital investment required for the service would need to be supported by the rates.

Table 4. Cost of collecting kitchen organics in Christchurch

Description	Price per unit	Units (1)	Total
Materials			
Buckets	15.00	30,000	450,000
Bags (degradable bags @ \$0.20 per bag) (2)	0.20	1,560,000	312,000
			762,000
Collection and processing costs			
Kerbside collection @ \$0.20 per pickup	0.20	1,560,000	312,000
Kitchen organics processing @ \$60 per tonne (3)	60.00	7,800	468,000
			780,000
TOTAL			1,542,000
Operational cost per tonne @ 7,800 tonnes per year			140
Avoided landfill costs			-84

Notes:

- 1) Assumes 24% of 125,000 households (30,000 households) placing 5 kgs per week out for collection (7,800 tonnes per year)
- 2) This calculation uses degradable bags (plastic polymers) which are cheaper than the starch bags used in the trial
- 3) Processing cost are based on invessel composting tenders received by the Council
EM Bokashi could be optional for households and is not included in this calculation
Costs exclude promotional material, additional containers required due to losses and staff time

7. Conclusions

This report investigated a collection system for kitchen organics suited to the Christchurch context it has established the community acceptance for the system and the related costs. This report found that a small container used to collect kitchen organics would not negatively impact on the other “disposal” options for organic matter such as home composting, Council composting operations and commercial collection. It found that a collection service which targets kitchen organics, collects material that is generally not composted and that would otherwise enter the landfill or wastewater treatment system. Based on these findings a trial collection of kitchen organics was performed.

The kerbside collection of kitchen organics was a resounding success. Those involved were overwhelmingly supportive of the service and were both willing to continue to use it in its current form and were willing to pay for the service in the rates. Nearly all the household involved used the service on a regular basis and most noticed a reduction in the waste that they produced. The organic material collected was generally odourless, was relatively dry and free of contaminants. The biodegradable bags used kept the kitchen organics well contained and kept the buckets clean throughout the trial. EM Bokashi minimised odours and the materials collected composted well in an open air windrow system.

The cost of a similar service city-wide in Christchurch was estimated at around \$1.5 million or \$140 per tonne. Such costs place this service in the order of the kerbside recycling service (\$160 per tonne, excluding processing costs) and the domestic refuse collection service (\$95 per tonne, including disposal). However, the costs also need to be weighed up against the economic and environmental benefits that such a service will provide. The benefits of diverting this material chiefly relate to the avoided landfill costs (\$84 per tonne), the reduction in costs associated with treating leachate and landfill gas, and the beneficial use of the material as a compost product. Taking these “savings” into account, the relative ease of the collection operation and the overwhelming public support from those involved, gives confidence in the viability of such a service in Christchurch.

8. Recommendations

This report recommends the following based on the findings of the research:

- An enclosed processing facility for putrescibles material should be established in Christchurch so the material collected from a future kitchen organics collection service can be adequately processed.
- A kitchen organics collection trial should be performed during Summer to assess the impact of higher temperatures on the collection system and the impact of season on the amount of material collected and on the participation. This trial should continue for a longer time to allow those involved to establish a routine and to become totally familiar with the service. Lining the buckets (with biodegradable bags, paper or plastic bags) would be crucial for the collection service to be acceptable to the public. A future trial could test a range of lining options.
- The container design needs further consideration: a) the kitchen container should have a detachable flip-top lid to make it easier to place food scraps into it; b) The kerbside container needs to be wide and squat (see picture 17), it should have an attached flip-top lid and the container needs to be a distinctive colour to stand out from the other kerbside collection containers.
- Consideration should be given to providing a similar collection service to businesses for example, small cafes or outlets where kitchen organics are typically disposed of to landfill. This should also be done in consultation with pig farmers who also provide another avenue for this material.
- Home composting should be promoted further to encourage people to take greater responsibility for the waste that they produce.
- Support should be provided to commercial green waste collection services to maximise their uptake, as apposed to mixed refuse wheelie bin collection services.
- Supermarkets and retail outlets should be encouraged to move towards degradable carry bags issued at the point of sale, as these can easily feed into a putrescible collection system.
- Overall, the collection system used was a success, with good participation and was highly regarded by those involved. The City Council should instigate a kitchen organics collection system in Christchurch as soon as processing technologies allow.



Picture 17. Alternative Kerbside Container

9. References

European Commission (2000) Success stories on composting and separate collection. Office for official publications of the European Communities, Belgium.

Favoino, E. (1999) Composting in Italy: the use of biodegradable bags to optimize source separation. Agricultural School of Monza, Italy.

Jarvis, P., Street, A. (1999) Audit of the unsorted component of the Christchurch City Council waste stream October / November 1999. Contract report LC9900/94 Landcare Research NZ, Lincoln.

Moore, T (2000) Zeroing in on food waste: Estimating the sources and sinks of putrescibles material in Christchurch, Lincoln University, Canterbury.

Moore, T (2002) Recycling and Composting in Christchurch: Public Opinion and Participation (Survey 2). Internal City Council Report, Christchurch.

Perkins, D. K. (2001) Request for further information: organics processing plant contract 2000/01-253. Living Earth Limited, Auckland.

Further reading about Effective Microorganisms (EM Bokashi):

<http://www.emro.jp/english/>

<http://www.emnusa.org>

10. APPENDIX

Appendix 1 Map of the trial area

Appendix 2 Letter introducing the trial to the residents

Appendix 3 Flyer asking residents to get involved

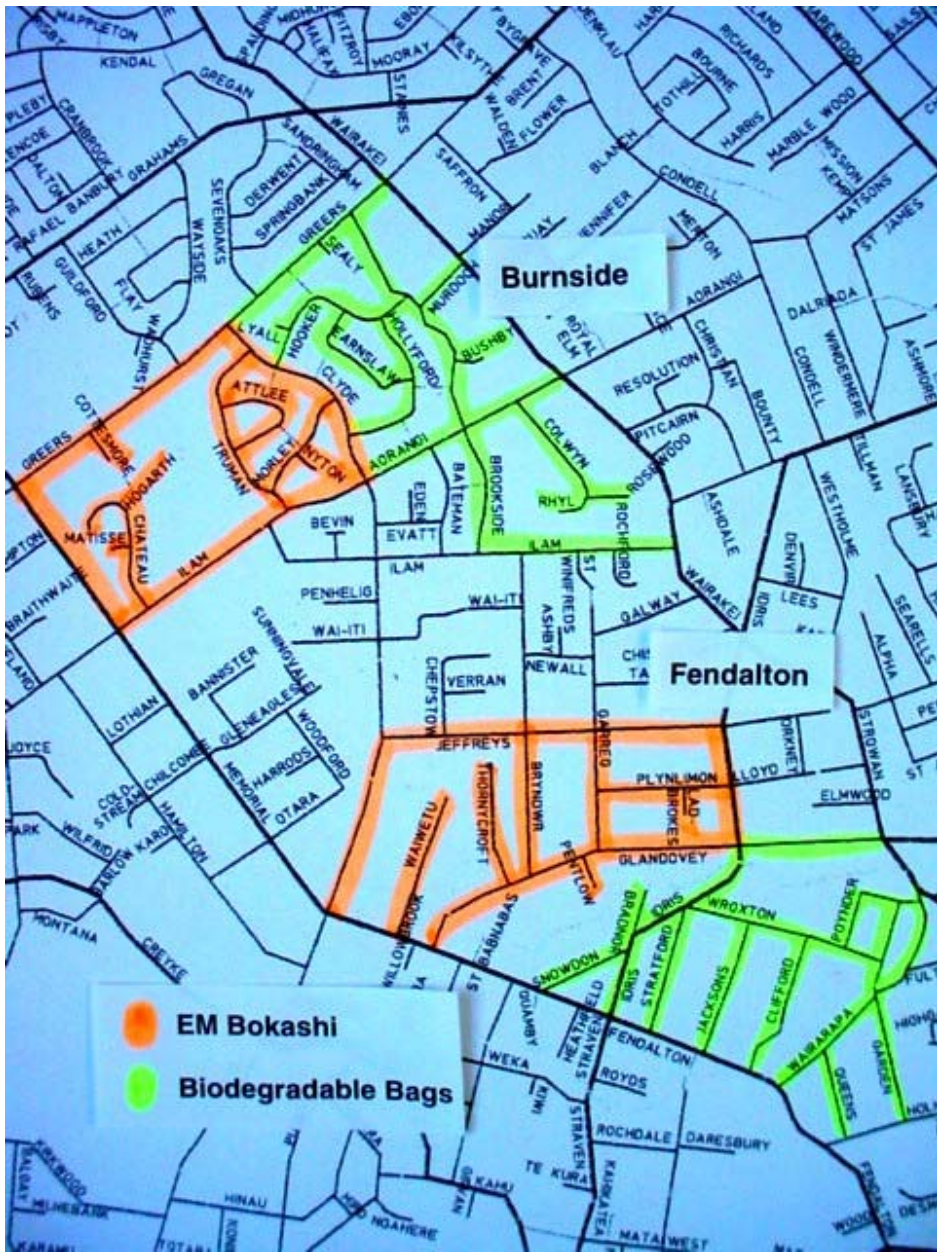
Appendix 4 Biodegradable bag instructions

Appendix 5 EM Bokashi instructions and additional information

Appendix 6 Kitchen Bucket Label

Appendix 7 Kitchen Organics Telephone Questionnaire

APPENDIX 1. Map of the trial area



APPENDIX 2. Letter introducing the trial to the residents



10 April 2002

Dear Resident

We seek your help to take another step towards Christchurch becoming a zero waste City.

Your home is in an area chosen by the City Council to participate in our voluntary kitchen organics kerbside collection trial. Christchurch residents have told us they are interested in a kerbside collection service for food scraps. Now we want to conduct a trial to see whether a kitchen organics collection will work for you. This service will complement the Council's normal rubbish and recycling services.

Organic matter, the largest part of the Christchurch waste stream, is a valuable resource and can readily be made into compost. Most people think that it's okay to send organic matter to the landfill, but, unfortunately, organic matter in the landfill produces gases that can add to global warming. We want Christchurch residents to have the best possible combination of services and to minimise the City's impact on the environment. Your involvement in this trial will help pave the way to a better future.

Additional information describing what is involved is included. Please take the time to read it and reply. If you have any further questions please phone our waste hotline on 371 1830

Your involvement in this pioneering project will help make this scheme a success.

I thank you sincerely for your co-operation and assistance.

Yours sincerely

Garry Moore
MAYOR

Appendix 3 Flyer asking residents to get involved

CHRISTCHURCH CITY COUNCIL

Kitchen Organics Collection Trial

Please return to us before Friday 26 April

Name: _____
 Address: _____
 Phone: _____

PLEASE TICK

YES I am willing to be involved in the eight week kitchen organics collection trial.

and/or

Please send me additional information on:

Home composting and worm farming.

Ways to reduce my household waste.

Got a question?
Then contact us on
Telephone 3711 830

Or check out our website:
www.ccc.govt.nz/waste

An eight week kerbside organic collection is being tested in your area and we would really appreciate your involvement, which is completely voluntary.

Kitchen Organics Recyclers

The Christchurch City Council, in conjunction with Garden City Composting, is testing a new recycling idea and we need your help.

We want to find out if a kitchen organics collection service works for you.

Kitchen organics include food scraps, fruit and vegetable trimmings and leftovers.



Here's WHAT we are asking you to do:

If you would like to be involved simply tick the YES box, fill in your contact details and return it to us by 26 April. Shortly afterwards, those involved will receive:

- A starter pack and instructions
- A special organics recycling bin.

- For the trial:
- 1 Put your food scraps into the organics recycling bin provided.
 - 2 Place the organics recycling bin at the kerb each week on your normal rubbish collection day and we will empty it.

The eight week trial will run from May to July 2002 and is completely voluntary. During that time we may contact you and at the end of the trial we would like your opinion on how it went.

Your involvement and feedback will help make this a good test of kitchen organics collection.

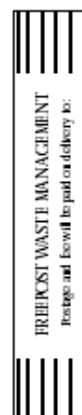


Here's WHY we are focusing on kitchen organics:

- Many people find it difficult to compost at home.
- Kitchen and garden organics can make up half of what goes into black rubbish bags.
- Collecting organics is the next biggest step the City can take to reduce domestic waste.
- Organic matter in the landfill breaks down, producing gases that can add to global warming.
- Organic matter can easily be turned into a valuable resource - compost.



No postage necessary if posted in New Zealand



TONY MOORE - CITY WATER AND WASTE
 CHRISTCHURCH CITY COUNCIL
 PO BOX 237
 CHRISTCHURCH

APPENDIX 4 Biodegradable Bags Instructions

This pack includes the following:

- This instructional leaflet.
- One card explaining what items can be placed in the organic recycling bucket.
- One large kerbside organics recycling bucket.
- One small kitchen bucket.
- One pack of biodegradable bags.



Got a question?
If your bucket is lost or damaged,
or if your large kerbside bucket is not emptied,
or for further information
contact us on:

Telephone: 371 1830
Email: waste@ccc.govt.nz

www.ccc.govt.nz/waste



Thanks!



for your involvement

The City Council greatly appreciates your involvement in our eight week kitchen organics kerbside collection trial. Here are some instructions for the trial – please read them carefully.



Waste City Council

CHRISTCHURCH
CITY COUNCIL • YOUR PEOPLE • YOUR CITY

Here's **WHAT** we'd like you to do:

- 1 Find a handy place to store your kitchen organics recycling buckets.
- 2 The small kitchen bucket is designed to be in the kitchen either under or on top of the bench.
- 3 The large kerbside organics bucket can be stored in the laundry, shed or garage.
- 4 Place the card on your fridge or in a handy location so you can easily refer to it.
- 5 Use one biodegradable bag each week to line your large kerbside bucket.
- 6 Store the remaining bags in a cool dry place. These bags are made of starch (like potato) and can break down if stored incorrectly.



Four easy steps to organics recycling

- 1 Place your kitchen organics in the small kitchen bucket.
- 2 Line the large kerbside bucket with the biodegradable bag provided.
- 3 Transfer your food scraps into the large kerbside bucket when needed.
- 4 Place the large kerbside bucket at the kerbside by 7.30 am on your normal rubbish and recycling day and we will empty it.



Collection day

The first collection will be **Tuesday 14 May**

The last collection day will be **Tuesday 2 July**

Please do not put your buckets out after this date as they will not be collected.

Trial details

Your involvement in the trial is completely voluntary so you can stop at any time. Just let the Council know by ringing 371 1830.

During the trial the Garden City Composting team will be taking measurements of some buckets and checking out any problems – feel free to discuss any problems with them.


At the end of the trial:


- You can keep the buckets or we can collect them from you.
- We will be conducting a phone survey to see what you thought of the service and will ask if you would like us to collect your buckets.

APPENDIX 5 EM Bokashi Instructions and Additional Information

This pack includes the following:

- This instructional leaflet.
- An EM Bokashi instruction booklet
- One large kerbside organics recycling bucket.
- One small kitchen bucket.
- Two bags of EM Bokashi, a natural odour neutraliser.







Got a question?
If your bucket is lost or damaged,
or if your large kerbside bucket is not emptied,
or for further information
contact us on:

Telephone: 371 1830
Email: waste@ccc.govt.nz

www.ccc.govt.nz/waste




Thanks!



for your involvement

The City Council greatly appreciates your involvement in our eight week kitchen organics kerbside collection trial. Here are some instructions for the trial – please read them carefully.



Christchurch
CITY COUNCIL • YOUR PEOPLE • YOUR CITY

Christchurch City Council
THE CORPUSCULUM PROFESSIONALS

Here's **WHAT** we'd like you to do:

- Find a handy place to store your kitchen organics recycling buckets.
- The small kitchen bucket is designed to be in the kitchen either under or on top of the bench.
- The large kerbside bucket can be stored somewhere with a constant temperature, such as the laundry, shed or garage.
- Place the card on your fridge or in a handy location so you can easily refer to it.
- Use the EM Bokashi as described in the instruction booklet.
- Store the EM Bokashi bags in a cool dry place. EM Bokashi contains dormant micro organisms that can become less effective if stored incorrectly.



Four easy steps to organics recycling

- 1 Place your kitchen organics in the small kitchen bucket and sprinkle a handful of EM Bokashi over the newly added food.
- 2 Transfer your food scraps into the large kerbside bucket when needed.
- 3 Before adding any food to the large kerbside bucket, sprinkle a handful of EM Bokashi into the bottom of the bucket. Always shut the lid tightly after use. Add extra EM Bokashi to the bucket, if required, for odour control.
- 4 Place the large kerbside bucket at the kerbside by 7.30 am on your normal rubbish and recycling day and we will empty it.



Collection day

The first collection will be Tuesday 14 May

The last collection day will be Tuesday 2 July

Please do not put your buckets out after this date as they will not be collected.

Trial details

Your involvement in the trial is completely voluntary so you can stop at any time. Just let the Council know by ringing 371 1830.

During the trial the Garden City Composting team will be taking measurements of some buckets and checking out any problems. You can discuss any problems with them.

At the end of the trial:

- you can keep the buckets or we can collect them from you.
- we will be conducting a phone survey to see what you thought about the service and will ask if you would like us to collect your bins.

Problems?

If your buckets have a bad smell make sure that:

- Both buckets are cleaned regularly.
- You have added enough EM Bokashi and that it is sufficiently mixed in with the food.
- The bucket lid is on tight.
- The bucket is not exposed to direct sunlight or extreme temperatures that could produce condensation on the inside of the bucket or disrupt EM Bokashi's biological processes.

If problems continue please ring 371 1830



Got a question?

For further information contact us on:

Telephone: 371 1830

Email: waste@ccc.govt.nz

www.ccc.govt.nz/waste



Kitchen Organics Recycling

EM Bokashi Instructions



Garden City Composting
THE COMPOSTING PROFESSIONALS

CHRISTCHURCH
CITY COUNCIL • YOUR PEOPLE • YOUR CITY

What is EM Bokashi

EM means Effective Microorganisms. EM is a combination of naturally occurring yeasts and bacteria that help control odours. Bokashi is a Japanese term that means fermented compost. It is a sawdust/bran-based material that has been mixed with EM liquid and dried. EM Bokashi is a harmless natural product and was discovered in Japan by Dr. Teruo Higa in the 1980's. EM technology is utilised in more than 80 countries worldwide to help with the composting process and to control odours.

How EM Bokashi works

EM Bokashi prevents the development of odour-causing bacteria by starting a process similar to pickling that gives off a pleasant smell, like baking bread or brewing beer.

How to use EM Bokashi

Where to locate the buckets

- Keep both buckets in a handy location.
- The best place for the small kitchen bucket is either on or under the kitchen bench.
- Put the large kerbside bucket in the laundry, shed or garage or in a place with a constant temperature and out of direct sunlight to minimise condensation forming inside the bucket that may lead to odours.

Storage of the EM Bokashi bags

- Store the bags somewhere that is warm, dry and out of direct sunlight. A kitchen or laundry cupboard is ideal.

When to add EM Bokashi

- Sprinkle a handful of EM Bokashi into the bottom of both buckets each time they are empty.
- Place your kitchen organics in the small kitchen bucket as you require and sprinkle a small handful of EM Bokashi over the top.



How much to add

- The general rule of thumb is one small handful of EM Bokashi for every 5 cm in depth of food scraps added to the small kitchen bucket. By the time the small kitchen bucket is full you should have added around 3 small handfuls of EM Bokashi.
- When adding high protein foods such as meat, fish and cheese use slightly more EM Bokashi.
- You have been provided with enough EM Bokashi to last for the eight week trial. However, if you think you will run out, please call 371 1830 and let us know.

How to use the small kitchen bucket

- Place your kitchen organics into the small kitchen bucket following the guidelines on the label and card.
- Every day, or as required, empty this bucket into the large kerbside bucket. Regular emptying and washing of this bucket is recommended.
- If large quantities of food are to be discarded, it may be best to put them directly into the large kerbside bucket with some EM Bokashi.
- Keep the material as dry as possible because excess moisture in the bucket may lead to odours developing.
- Make sure that you shut the lid after use.

How to use the large kerbside bucket

- After you add your kitchen organics to the large kerbside bucket, make sure you close the lid tightly. EM Bokashi needs an airtight environment to control odours.
- Apart from the initial handful of EM Bokashi into the bottom of the bucket, you should not need to add additional EM Bokashi unless you need to control odour.
- This bucket should have a pickling/fermenting type smell when working properly.
- Place this bucket out at the kerbside for collection along with your recycling by 7:30 am.

APPENDIX 6 Bucket Label



APPENDIX 9 Kitchen Organics Recycling - Questionnaire

Phone number

Interviewer

Good evening. My name is _____ from the Christchurch City Council.

We're conducting a survey as part of the kitchen organics recycling trial that your household may have been involved with. We would value your opinion of the service by answering this short survey.

Could I please speak to the person in your household who is mainly or jointly responsible for household matters or who was mainly involved with the kitchen organics trial.

Reintroduce if necessary

This survey could take about 15 minutes depending on how you answer the questions.

Is now a convenient time for you?

If no

What time would you like me to call back.....

Over the past 8 weeks the City Council has been running an organics recycling trial, where households separated their kitchen organics like food scraps and fruit and vegetable trimmings for the Council to collect at the kerbside.

1) Was your household involved in this organic recycling trial ?

Yes 1 (skip to question 3)

No 2

Don't know 99 **Ask** Is there someone home who may know and could answer the survey? (**No** = call again; **Yes** = may I please talk to that person)

2) What were your reasons for deciding **NOT** to participate in the organics recycling trial ?

DO NOT READ OUT

Not aware of trial / did not receive anything	1	Unaware
Already compost food waste	2	Compost
Have an insinkerator / waste disposal unit	3	Insinkerator
Use the black Council bags for waste	4	Council bags
Have a commercial waste collection service	5	Commercial
Too messy / smelly / hygiene	6	Hygiene
I don't have much food waste	7	Amount
I don't have enough time	8	Time
Not enough space	9	Space
Didn't know what to do / lack of information	10	Knowledge
Can't be bothered	11	Lazy
Other	98	

Please specify.....

Thank you for your time..... *End the call*

A) OVERALL

3) What was your main reason for becoming involved in the kitchen organics recycling trial?

DO NOT READ OUT

Thought I had to / I felt obligated	1
It's a good idea / good for the environment	2
We have a lot of food waste	3
I want to reduce my waste	4
Composting makes sense	5
Wanted to see what it was about / curiosity	6
Other	98

Please specify.....

4) How good or bad do you think the kitchen organics recycling service was overall?

Very good	1
Good	2
No feeling either way	3
Bad	4
Very Bad	5
Don't know	99

5) Over the eight-week trial how often did you put out your organics bucket for collection?

Never	0	
Once	1	
Twice	2	
3 times	3	
4 times	4	
5 times	5	
6 times	6	
7 times	7	
8 times	8	(skip to question 7)
Don't know	99	

6) What were the reasons, if at any time you didn't put out your organics bucket for collection?

DONT READ OUT

Didn't have much food waste to put out	1	Amount
Forgot to do it	2	Forgot
I was away / holiday / not home	3	Away
Didn't have enough time	4	Time
Too messy / smelly / hygiene	5	Hygiene
Didn't know what to do / lack of information	6	Knowledge
Too difficult / too many containers to deal with	7	Difficult
Couldn't be bothered	8	Lazy
Other	98	

Please specify.....

7) How willing would you be to separate your kitchen organics for collection, if the **CURRENT** kitchen organic service continued indefinitely?

- Very willing 1
- Reasonably willing 2
- No feeling either way 3
- Not very willing 4
- Not willing at all 5
- Don't know 99

8) What things did you like about the kitchen organics collection service ?

- 1.....
- 2.....
- 3.....

9) What things did you dislike about the kitchen organics collection service ?

- 1.....
- 2.....
- 3.....

10) Do you have any suggestions for improving the kitchen organic collection service ?

- 1.....
- 2.....

11) If the service could be **IMPROVED** to overcome your dislikes and incorporate your suggestions, how willing would you be to continue separating your kitchen organics for collection in the future?

- Very willing 1
- Reasonably willing 2
- No feeling either way 3
- Not very willing 4
- Not willing at all 5
- Don't know 99

B) BUCKETS

The next questions relate to the buckets the Council provided to you for the trial.

The Council is happy if you want to keep the buckets for your own use, but if you would like us to collect them place them at the kerbside **EMPTY** by 7.30 am on **Tuesday July 16**. (Not read after date)

Now thinking about the **GREEN BUCKET** with the white lid that you placed at the kerb each week.

12) Where did you store this bucket during the week, before you placed it at the kerbside for collection?

Garage	1
Car-port	2
Shed	3
Kitchen	4
Pantry	5
Laundry	6
Outside	7
Other	98

Please specify.....

13) In general, was the size of the green bucket too big, too small, or about right to hold all your kitchen organics?

Too big	1
Too small	2
About right	3
Don't know	99

14) How easy or difficult was the green bucket to use?

Very easy	1	
Easy	2	
No feeling either way	3	(Skip to question 16)
Difficult	4	
Very difficult	5	
Don't know	99	(Skip to question 16)

15) Why was the bucket easy or difficult to use?

1.....

2.....

16) Was your green bucket not emptied by the Council at any stage during the trial after you had placed it at the kerbside for collection ? (i.e. missed for collection)

Yes	1
No	2
Don't know	3

Now thinking about the **KITCHEN BUCKET** with the screw top lid, which you placed your food scraps directly into before transferring them to the green bucket.

17) Where did you store this bucket?

Did not use this bucket	0 Ask	<i>What was the reason for not using this bucket?</i> (skip to section C)
-------------------------	-------	--

In the kitchen

On the bench	1
Under the bench	2
In the pantry	3
On the floor	4
Other (in kitchen)	5
Laundry / washroom	6
Garage / carport	7
Outside	8
Other	98

Please specify.....

18) How often did you empty the kitchen bucket into the green kerbside bucket?

Twice or more a day	1
Once a day	2
Every 2 days	3
Every 3 days	4
Every 4 days or less	5
Other	98
Don't know	99

19) In general, was the size of the kitchen bucket too big, too small, or about right to hold your kitchen organics?

Too big	1
Too small	2
About right	3
Don't know	99

20) How easy or difficult was the kitchen organics bucket to use?

Very easy	1	
Easy	2	
No feeling either way	3	(skip to question 22)
Difficult	4	
Very difficult	5	
Don't know	99	(skip to question 22)

21) Why was the bucket easy or difficult to use?

1.....

2.....

C) BIOBAG or EM BOKASHI

22) At the start of the trial, were you provided with bags of EM Bokashi **OR** biodegradable bags?

Biodegradable bags 1
EM Bokashi 2 (go to question 29)

The next questions relate to the **BIODEGRADABLE BAGS** you were provided.

23) In general, how easy or difficult was the biodegradable bag to use?

Very easy 1
Easy 2
No feeling either way 3 (skip to question 25)
Difficult 4
Very difficult 5
Don't know 99 (skip to question 25)

24) Why was the biodegradable bag easy or difficult to use?

1.....
2.....

25) Did you tie or fold over the top of the bag when you placed it out for collection?

Yes 1
No 2

26) Can you please score the following on a scale of 1 to 4

Where: 1 = not at all, 2 = slightly, 3 = moderately, 4 = strongly and 5 = extremely

	Not at all	Slightly	Moderately	Strongly	Extremely
d) How smelly you thought the small kitchen bucket got	1	2	3	4	5
e) How smelly you thought the green kerbside bucket got	1	2	3	4	5
f) How dirty you thought the green kerbside bucket got	1	2	3	4	5

27) How many times did you wash or rinse the green **kerbside** bucket during the 8 weeks

Number of washes e.g. 0,1,2,3

28) Did the biodegradable bag you were using tear, split or fall apart at any stage during the eight-week trial?

Yes 1
No 2
Don't know 99

(Now skip to section D)

The next questions relate to the **EM BOKASHI** you were provided.

29) In general, how easy or difficult was the EM Bokashi to use?

Very easy 1
 Easy 2
 No feeling either way 3 (skip to question 31)
 Difficult 4
 Very difficult 5
 Don't know 99 (skip to question 31)

30) Why was the EM Bokashi easy or difficult to use?

1.....

2.....

31) Do you think the **amount** of EM Bokashi you were provided with was too much, not enough or about right for the 8 week trial?

Too much 1
 Not enough 2
 About right 3
 Don't know 99

32) Can you please score the following on a scale of 1 to 4

Where: 1 = not at all, 2 = slightly, 3 = moderately, 4 = strongly and 5 = extremely

	Not at all	Slightly	Moderately	Strongly	Extremely
g) How smelly you thought the small kitchen bucket got	1	2	3	4	5
h) How smelly you thought the green kerbside bucket got	1	2	3	4	5
i) How dirty you thought the green kerbside bucket got	1	2	3	4	5

33) How many times did you wash or rinse the green **kerbside** bucket during the 8 weeks

Number of washes e.g. 0,1,2,3

34) Is there any reason you would not use EM Bokashi in the future if it were part of a kitchen organics collection service?

Please specify

.....

D) INFORMATION / PROMOTION

The next questions relate to the information that you received about the trial.

Each household in the trial was provided with instructions detailing what to do during the trial and what items to place into the kitchen organics bucket.

35) Thinking firstly about the **label that outlined what items to place into the buckets, How easy or difficult to understand did you find the label?**

Very easy	1
Easy	2
No feeling either way	3
Difficult	4
Very difficult	5
Don't know	99

36) Now thinking about the **instructions that detailed what to do during the trial How easy or difficult to understand did you find the instructions?**

Very easy	1
Easy	2
No feeling either way	3
Difficult	4
Very difficult	5
Don't know	99

37) Did you find the **amount of information provided enough, not enough or about right to perform kitchen organic recycling?**

Enough	1
Not enough	2
About right	3
Don't know	99

38) Did you or anyone in your household telephone the Council at any time during the trial to seek help or clarification about the trial?

Yes	1
No	2
Don't know	99

39) Do you have any suggestions about improvements to the information provided that could be made to help you perform kitchen organics recycling?

Suggestions:

.....

.....

E) WASTE HABITS

We are almost at the end of the survey – I really appreciate your time.

Now, the next set of questions relate to the impact that the organics collection may have had on your household waste.

40) Thinking about the time **DURING** the trial, how many black rubbish bags did you put out for collection each week

Number of bags
(e.g. 0, 1/2, 1, 2, 3)

41) Do you have a regular commercial **waste** or **garden organics** collection service (e.g. a wheelie bin or drum for your waste)?

No	1	(skip to question 43)
Waste	2	
Garden organics	3	
Both	4	
Don't know	99	

42) How often **DURING** the trial did your commercial collector pick up your wheelie bin or drum?

Weekly	1
Fortnightly	2
Monthly	3
On demand	4
Other	98

43) To what extent do you think the kitchen organics service has reduced the amount of waste you put out for collection, either in the black rubbish bag or in a commercial wheelie bin.

No reduction at all	1
A small reduction	2
A moderate reduction	3
A large reduction	4
A very large reduction	5
Don't know	99

44) What would you have done with your kitchen organics **BEFORE** this trial ?

Black rubbish bag	1	
Commercial waste collector	2	
Commercial garden organics collector	3	
Insinkerator / waste disposal unit	4	(skip to question 46)
Composted at home	5	(skip to question 47)
Fed to animals	6	
Don't know	99	
Other	98	

Please specify.....

45) Do you have an insinkerator or waste disposal unit in your kitchen sink?

Yes 1
No 2

46) Do you compost at home ?

Yes 1
No 2 (go to question 49)

47) The next questions relate to the amount of composting you do at home. This includes worm farms and other composting techniques. Using the following categories....all of it, most of it, half, some and none of it....

- a) How much of your **kitchen organics** do you compost at home?
b) How much of your **garden waste** is composted by the **Council** i.e. taken to the refuse station for composting?
c) How much of your **garden waste** do you compost at **home**?

	a) Food waste	b) Council composting	c) Home composting
All of it	1	1	1
Most of it	2	2	2
About half of it	3	3	3
Some of it	4	4	4
None of it	5	5	5
Other	98	98	98
Don't know	99	99	99

48) If the kitchen organics collection service was provided to you indefinitely would you use the buckets rather than composting your kitchen organics at home?

Yes 1
No 2
Depends 3
Don't know 99

49) Which of the following best describes how much you would be prepared to pay extra in your rates **each week** for the kitchen organic collection service ?

Not willing to pay any more 1
Up to 20 cents per week 2
Between 20 and 50 cents per week 3
Between 50 cents and \$1.00 4
Between 1.00 and \$1.50 5
Over \$1.50 6
Don't know 99

F) HOUSEHOLD PROFILE

Finally, I'd like to ask you a few questions about your household situation for classification purposes. You may decline a question at any stage, if you're unhappy or uncomfortable about giving an answer.

50) Which of the following represents your household situation ?

Read out

Household with the youngest child under 5	1
Household with the youngest child between 5 and 18	2
Household with no children	3
Student flat (e.g. University or Polytech)	4
Household where English is a second language	5
None of these	98

51) Do you own or rent your home?

Owned	1
Rented	2

52) How many people altogether live in your household, including yourself, any boarders, flatmates and children?

One	1
Two	2
Three	3
Four	4
Five	5
Six	6
Seven	7
Eight or more	8
Declined	97

53) In which of the following groups is your total household income before tax per year.

Up to \$20,000	1
Over \$20,000 and up to \$40,000	2
Over \$40,000 and up to \$60,000	3
Over \$60,000 and up to \$80,000	4
Over \$80,000	5
Don't know	99
Declined	97

54) In which of the following age groups do you fall

24 or under	1
Between 25 and 44	2
Between 45 and 64	3
65 or over	4
Declined	97

Thank you very much for your time and effort, in answering this survey and being involved in the trial we really appreciate your involvement and will keep you informed of the results when they are available in roughly 1 months time. Have a good evening. – *end call*