Kitakyushu Initiative for a Clean Environment:

Composting Workshop in Bago, Bacolod and Cebu, Philippines

Workshop Report

May 2008

United Nations Economic and Social Commission
for Asia and the Pacific (UNESCAP)
Institute for Global Environmental Strategies (IGES),
Kitakyushu Office
City Governments of Bago, Bacolod and Cebu, the Philippines

Published by the Institute for Global Environmental Strategies (IGES).

Printed in Japan.
Printed on recycled paper.

Kitakyushu Initiative: Composting Workshop in Bago, Bacolod and Cebu, the Philippines in May 2008

Table of Contents:

Ⅰ. **Concept Note** **P.5**

Ⅱ. **Workshop Programme** **P.9**

Ⅲ. **Field Notes** **P.15**

(1) **Background** **P.17**

(2) **Objective** **P.18**

(3) **Project Schedule** **P.18**

(4) **Summary** **P.20**

(5) **Follow-up** **P.28**

(6) **Takakura Compost Methods** **P.28**

Ⅳ. **Presentations** **P.33**

(1) **Basic Concept of Compost** **P.35**

(2) **Evaluation of composting activities for market and community waste** **P.57**

(3) **Economic and Political Analysis of Composting** **P.75**

Ⅴ. **List of Participants** **P.91**

Ⅵ. **Photos** **P.99**

Ⅰ. Concept Note

Kitakyushu Initiative for a Clean Environment
National Training on Solid Waste Management: Composting and Waste Segregation
Bago City's Eco Center, Philippines
19-20 May 2008

CONCEPT NOTE

Background

Solid waste has been identified as one of the core issues in urban environmental management. The changing consumption patterns, rising quality of life and population growth have seen to create negative impacts on both local and global environmental scale. There have been concerns regarding the effective management of the waste particularly collection, segregation of waste, transport, disposal, however, authorities particularly those in local governments are bounded within their limited capacities to overcome these waste challenges.

While waste problems have clearly manifested unintended impacts, however waste problems too have opened the window for local governments to find opportunities for economic and social improvements through local actions. Through the participation of communities and private sectors, these local actions explored innovative technologies, behavioral changes and other approaches in managing solid waste and have been proven beneficial not only to the environment but also to socio-economic conditions of the people. These have been amply demonstrated by good practices from many cities in Asia Pacific region.

Since its inception in year 2000, the Kitakyushu Initiative for a Clean Environment has actively promoted replication of successful policies and local initiatives on urban environmental management. The recent addition to its list of demonstration project is Bago City's project on "Solid Waste Management as a Social Enterprise: A Community-based 3R Approaches in Bago City, Philippines". The project showcases household composting, waste segregation (waste banking) and environmental education in communities and schools. These activities are designed after the successful practices of Surabaya, Indonesia and Nonthaburi, Thailand and are expected to open income and livelihood opportunities, cultivate environmental consciousness and improve environmental condition of the city.

***Takakura method** is a set of composting methodologies developed in Surabaya, Indonesia. It uses native microorganisms (NM) for composting which is cultured and fermented from locally available materials such as fresh fruits and vegetable peels, yoghurt, tempe, brown sugar, rice bran and rice husks.*

This method is characterized by simple technology and low-energy requiring only the use of shredder to prepare the organic wastes.

It can be applied on household level (Takakura Home Method) by using baskets and can also be applied for composting market wastes.

Objectives

The main objective of this training is to introduce composting and waste segregation as an avenue to waste management and livelihood development. Specifically it aims to:

1. Introduce in-depth concepts of composting methods and waste segregation.
2. Hands-on demonstration of compost methods, particularly Takakura-home method.
3. Present the potential of composting towards economic and social improvements,
4. To present successful practices on composting and waste segregation

Expected Outcomes

Expected outcomes from the workshop include the following:

1. Achieve in-depth knowledge on waste composting practices,
2. Learn the impacts and actual implementation of Takakura-home method and its application to household and market waste.
3. Integrate composting to solid waste management system of cities.

Organizers

The workshop is organized by the Kitakyushu Initiative Network Secretariat – Institute for Global Environmental Strategies (IGES) in collaboration with the United Nations Economic and Social Commission in Asia and the Pacific (UNESCAP) and the City Government of Bago.

Date and Venue

Date: 19-20 May, 2008
Venue: Ecocenter, Bago City, Philippines

Programme

Day-1: Monday, May 19th, 2008

1. Orientation
2. Basics of composting
   - Definition of composts
   - Objective of composting
   - Potential of composting
   - Condition for composting
   - How to produce composts
   - Heat generation by organic waste and functions by microorganisms during fermentation
3. Microorganisms for composting
   - Collecting from the nature
   - Culturing of local microorganisms (actual application)
4. Economic, social and environmental impacts of waste segregation and composting
   - Case studies from Surabaya, Nonthaburi, San Fernando and Dhaka
   - Local policies, institutional arrangement and incentives given to stakeholders

- Business model
- Social and environmental impacts

Day-2: Tuesday, May 20th, 2008

5. Microorganism for composting
   - Observation of cultured microorganisms
6. Evaluation of composts
   - Quality evaluation of composts
7. Implementation of Takakura Home Method (THM)
   - Basic structure and function of THM
   - How-to-use and effects of THM
8. Composting of market waste
   - Basic concepts and actual implementation
9. Examination and issuing training certificate

Lecturer

1. Mr. Kouji Takakura - Founder of Takakura composting methodologies, Jpec - Japan
2. Mr. Toshizo Maeda - Researcher, Institute for Global Environmental Strategies (IGES), Japan

Participants

Participants will include solid waste management practitioners from local governments.

Inquiries

Ms. Peachie Ann Aquino
Programme Officer
Institute for Global Environmental Strategies
Fax: +81-93-513-3712
Email: aquino@iges.or.jp

Mr. Vicente Mesias
Supervising Environment Management Specialist
Office of the City Mayor, Bago City
Tel: 63-34-461-0164
Fax: 63-34-732-8035
Email: jvicmesias@yahoo.com

Ⅱ. Workshop Programme

Workshop Programme

The series of workshop programmes consisted of 1) lectures on basic concepts of compost and economic, social and environmental impacts of that practice, and 2) actual hands-on training of composting. Below are the workshop programmes in Bago, Cebu and Bacolod (programmes in Cebu and Bacolod were the same).

2-day Composting Training Workshop in Bago

Date: 19-20 May 2008 (2 days)
Venue: Eco Centre, Bago City
Participants: around 50
Lecturer: Mr. Koji Takakura (JPec, Japan; founder of Takakura composting methods) and Mr. Toshizo Maeda (IGES Kitakyushu Office)

Day-1: Monday, 19 May 2008

- Venue: Bago City Hall

Time	Programme	By:
9:00-9:30	Registration	
9:30-10:00	1. Orientation	Mr. Takakura
10:00-12:00	2. Basics of composting • Definition of composts • Objective of composting • Potential of composting • Condition for composting • How to produce composts • Heat generation by organic waste and functions by micro-organisms during fermentation	
12:00-13:30	Lunch	
13:30-15:00	3. Micro-organisms for composting • Collection from the nature • Culturing of local micro-organisms	Mr. Takakura
15:00-16:00	4. Economic, social and environmental impacts of waste segregation and composting • Case studies from Surabaya, San Fernando and Dhaka • Local policies, institutional arrangement and incentives given to stakeholders • Business model • Social and environmental impacts	Mr. Maeda
16:00-16:30	Wrap-up	

Day-2: Tuesday, 20 May 2008

- Venue: Eco Center, Bago City

Time	Programme	By:
9:00-10:00	5. Micro-organism for composting • Observation of cultured micro-organisms	Mr. Takakura
10:00-11:00	6. Evaluation of composts • Quality evaluation of composts	
11:00-12:00	7. Implementation of Takakura Home Method (THM) • Basic structure and function of THM • How-to-use and effects of THM	
12:00-13:30	Lunch	
13:30-14:30	8. Composting of market organic waste • Basic concepts and actual implementation	Mr. Takakura
14:30-15:00	Wrap-up	

1-day Hands-on Composting Training in Cebu

Date: Saturday, 17 May 2008 (1 day)
Venue: Hall of Pagtambayayong Foundation (NGO), Cebu
Participants: around 80

1-day Hands-on Composting Training in Bacolod

Date: Wednesday, 21 May 2008 (1 day)
Venue: AM: Conference Room, League of Barangays, Bacolod
PM: South Terminal (under Agricultural Department), Bacolod
Participants: around 70

Time	Programme	By:
9:00-9:30	Registration	
9:30-11:00	1. Basics of composting • Definition of composts • Objective of composting • Potential of composting • Condition for composting • How to produce composts • Heat generation by organic waste and functions by micro-organisms during fermentation 2. Micro-organisms for composting • Collection from the nature • Culturing of local micro-organisms	Mr. Takakura
11:00-12:00	3. Economic, social and environmental impacts of waste segregation and composting • Case studies from Surabaya, San Fernando and Dhaka • Local policies, institutional arrangement and incentives given to stakeholders • Business model • Social and environmental impacts	Mr. Maeda
12:00-13:30	Lunch	
13:30-15:30	4. Implementation of Takakura Home Method (THM) • Basic structure and function of THM • How-to-use and effects of THM 5. Composting of market organic waste • Basic concepts and actual implementation	Mr. Takakura
15:30-16:00	Wrap-up	

Ⅲ. Field Notes

Field Notes

(1) Background

Bago City, which has population of around 150,000 and located in Negros Occidental in the Philippines, has initiated a solid waste management programme called KABAHIN KA Programme in 2005. To learn more from other cities' practices and to enhance the ongoing programme, Bago City joined the Kitakyushu Initiative Network (KIN) in 2006 and sent delegates to the study tours organised by KIN in Nonthaburi, Thailand in December 2005 and Surabaya, Indonesia in February 2007. By learning from that, Bago City has developed a refined KABAHIN KA Programme which incorporates the ideas such as a waste banking scheme in Nonthaburi and Takakura composting methods in Surabaya and submitted a proposal to the Asia-Pacific Forum for Environment and Development (APFED) for financial support. The proposal was selected as one of the APFED Showcase Projects in 2007 and the implementation started in 2008, which has been closely monitored and assisted by Institute for Global Environmental Strategies (IGES) Kitakyushu Office since then.

Bago City's APFED Showcase Project started in April 2008 by holding an inception workshop which was financed by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and attended by delegates from 12 other cities including Surabaya from Indonesia, Bacolod, Kabankalan, San Carlos, La Carlota, Bais, Iloilo, Cebu, Makati, Puerto Princesa, San Fernando and Tacurong, Provincial Government of Negros Occidental, and two national organisations namely National Solid Waste Management Commission and League of Cities of the Philippines. Following that, one-week hands-on composting training and two-day composting workshop were held in Bago City in April and May 2008, respectively. The project will run until March 2009 and substantial waste reduction is expected through composting practices at homes and markets and waste banking scheme and environmental awareness campaign at selected schools and communities. Before concluding the project, Bago City together with Bacolod City will host a national dialogue on successful community-based solid waste management practices by demonstrating the achievements in one year and to discuss the outputs and challenges of the Ecological Solid Waste Management Act (RA9003) in the Philippines which was enacted in 2000.

Since population of Bago City is only 150,000 and the impact of the project will be limited if the project is confined in the city, hands-on composting training, a key

component of Bago City's project, was also introduced to other cities such as Bacolod and Cebu, which are considered highly urbanised with population of around 500,000 and 800,000 each to bring about larger impacts.

(2) **Objective**

Main objective of organising workshops in three cities in Bago, Bacolod and Cebu was to disseminate a successful community-based solid waste management practice, especially composting methods, in Surabaya, Indonesia – which has achieved 10% reduction of waste in three years and has been spreading to other cities in Indonesia – to cities in the Philippines from those cities.

Focus was given specifically to implementation of composting practices because it is a key component of success in Surabaya and easy to replicate as it does not require large investment or special equipment but only locally available resources, and organic waste segregation through promotion of composting leads to further segregation and large waste reduction as organic waste usually comprises over 50% of overall waste.

(3) **Project Schedule**

A rough schedule of Bago City's Project is given below (this workshop report covers the events in April-May 2008 in bold letters):

Month	Event	Notes
10-11 April 2008	Inception Workshop in Bago	Attended by delegates from Surabaya, 11 other domestic cities, Negros Occidental Provincial Government, National Solid Waste Management Council (NSWMC), League of Cities of the Philippines and UNESCAP; around 50 participants
22-26 April	**Hands-on composting training in Bago**	**Attended by Eco Centre staff, model community representatives, local NGOs and city officers; around 50 participants**
17 May	**1-day composting training in Cebu**	**Attended by local NGOs, community groups, city officers; around 80 participants**

19-20 May	**2-day composting workshop in Bago**	**Attended by Eco Centre staff, model community representatives, local NGOs and city officers; around 50 participants; participants from 4 other cities including San Fernando, Cebu, San Carlos and Cavite.**
21 May	**1-day composting training in Bacolod**	**Attended by barangay representatives and city officers; around 70 participants**
July-August	Follow-up (site visit)	
Oct-Nov	Follow-up (site visit)	
February 2009	National Dialogue on Community-based SWM (final workshop)	Invite around 10 domestic cities, NSWMC and League of Cities of the Philippines for the discussion.
March 2009	Closing the project	Final report

A rough schedule of Bago City's Project is given below (this workshop report covers the events in April-May 2008 in bold letters):

Month	Event	Notes
10-11 April 2008	Inception Workshop in Bago	Attended by delegates from Surabaya, 11 other domestic cities, Negros Occidental Provincial Government, National Solid Waste Management Council (NSWMC), League of Cities of the Philippines and UNESCAP; around 50 participants
22-26 April	**Hands-on composting training in Bago**	**Attended by Eco Centre staff, model community representatives, local NGOs and city officers; around 50 participants**
17 May	**1-day composting training in Cebu**	**Attended by local NGOs, community groups, city officers; around 80 participants**
19-20 May	**2-day composting workshop in Bago**	**Attended by Eco Centre staff, model community representatives, local NGOs and city officers; around 50 participants; participants from 4 other cities including San Fernando, Cebu, San Carlos and Cavite.**
21 May	**1-day composting training in Bacolod**	**Attended by barangay representatives and city officers; around 70 participants**
July-August	Follow-up (site visit)	
Oct-Nov	Follow-up (site visit)	
February 2009	National Dialogue on Community-based SWM (final workshop)	Invite around 10 domestic cities, NSWMC and League of Cities of the Philippines for the discussion.
March 2009	Closing the project	Final report

(4) Summary

General

A large number of participants attended the workshops held in the three cities of Bago, Cebu and Bacolod, coming from different sectors like local governments, communities and NGOs. This high turnout could be attributed to growing concerns of citizens and local governments on issues related to solid waste management and its impact to urban environment. Consequently, the specific mandates given to local governments and communities for the management of municipal solid waste under the Republic Act 9003 or the Ecological Solid Waste Management Act has been instrumental in creating interest on waste management strategies.

The workshop has given specific focus on the implementation process of composting practices due to its salient features: (1) it is a set of proven technological methods and a key component which supported the 10% waste reduction achievement in Surabaya, Indonesia, 2) it is easy to replicate in other cities as it does not require large investment or special equipment but just local materials, a place for composting and a shredder, 3) organic waste segregation is the first step to promote further segregation and recycling of waste, 4) organic waste usually comprises more than 50% of household waste, thus a large portion of waste reduction can be expected by promoting composting, 5) quality organic compost is marketable as the demand is high due to price hikes in crude oil and chemical fertiliser, 6) it is labour intensive and creates job opportunities and income generation for some, 7) market organic waste is an ideal raw material for composts and it is usually unused and disposed of at dumping sites, 8) it has health and hygienic impacts by removing potentially putrefying materials from the waste, and 9) it promotes community solidarity through segregated waste collection.

Bago City

The two-day workshop in Bago City was attended by about 50 participants, mostly the Eco Centre staff who will eventually act as trainers and direct implementers of composting activities in the city. Representatives from model communities, NGOs, women's group and Bago city officials attended the training as well as representatives from other cities including San Fernando, Cebu, San Carlos and Cavite.

The first day of the workshop focused on the discussion of theories and concepts of composting while second day was spent on actual hands-on demonstration of composting techniques. Shredded market waste applied to the seed compost three days prior to the workshop, which had already been decomposed by that time, was demonstrated to the participants. Household compost baskets filled with seed composts were distributed to 20 households in Barangay Lag Asan, a model community, prior to the workshop and the performance after three-day usage – mostly decomposed without offensive odour – was also displayed to the participants.

Bago City had already purchased 50 plastic baskets for households use prior to the workshop and the remaining 30 will be distributed to other households subsequently when a sufficient supply of the seed compost is ready. Initially, the plastic baskets and the lids did not have holes for aeration, so the staff of Eco Centre made holes on both using drills, and then redistributed them. Other than plastic buckets, bamboo baskets are being prepared for distribution for the same purpose, which are manufactured by farmers in Bago City. Similarly, clay pots, which are usually used for plants, are being used as a household composting container on a trial basis that is also performing well. Once those types are also found to be reliable, they will be further distributed to other households to promote household composting and waste segregation at source.

There are already two (2) heaps of seed composts in Eco Centre which were produced from mixing five (5) sacks each of rice husks, rice bran and mud-press (residual of processed sugar cane other than bagasse and molasses) and fermented local micro-organisms. This is left and mixed once a day for three weeks. One (1) heap was packed into 20 household baskets for household use and another was mixed with shredded market waste with a ratio of one (1) shredded market waste to four (4) seed compost. Then, the shredded market waste fermented well in the high temperature and mostly decomposed in three (3) days. Observing the performance of seed compost, it was advised that the seed compost should be applied to the market waste in a ratio of one (1) to one (1) and be shredded together to enhance better mixing. It is expected that the decomposition will mostly finish in one (1) week and after that, it can be applied to another market waste for shredding and mixing again and so on. In that way, it is expected that there will be two (2) heaps ready in a week and four (4) heaps in two (2) weeks, and subsequently eight (8) heaps ready in three (3) weeks and Eco Centre will be fully composting most of the market organic waste – around one (1) ton a day – in a month. It is expected to increase the number of seed

compost in that way and supply some for household use at the same time. Producing original seed compost from rice husks, rice bran and mud-press was also encouraged to adjust the performance of market waste compost whenever there is something wrong in the performance.

The success of composting practice in Bago City so far can be attributed to the well-designed and clear implementation structure. Roles and responsibility of key actors are well-defined such as; there is full support for the project by the mayor first of all; a team of city officers are specifically allocated for the project implementation headed by Mr. Vic Mesias; model barangays are identified for pilot implementation with their full support; and Eco Centre is designated to be a composting centre for market organic waste and its staff is trained to provide technical assistance for each household composting practice. Initial training was conducted on 22-26 April 2008 followed by an inspection on 16 May and two-day Workshop on 19-20 May.

Another prominent feature of the project in Bago City is that the staffs of Eco Centre are providing technical assistances to other cities including Bacolod and Cebu. Some people from Cebu have already visited Bago to learn the initial preparation of composting practice and some staff of Eco Centre, Bago City, has travelled to Cebu to supervise that. Staffs of Eco Centre are also occasionally supervising composting practices in Bacolod, as it is the neighbouring city. This kind of cooperative relationship is expected to expand to other cities once the market waste composting in Bago becomes operational.

Cebu City

The workshop in Cebu City was organised as a response to the invitation by Mr. Paul Villarete, City Planning & Development Coordinator, Cebu City and a counterpart of the Kitakyushu Initiative Network, who attended a workshop in Bago on 10-11 April 2008. It was a first trial in Cebu, but thanks to his effort and strong communication through the NGO network, more than 80 concerned citizens attended the one-day workshop. The workshop was held in a hall of Pagtambayayong Foundation, an active NGO in Cebu, which functions as a core of NGO network. The founder of Pagtambayayong Foundation, Mr. Bimbo Fernandez, is currently appointed as a City Administrator. It is said that the number of willing participants was much larger than that but they limited the number to two (2) from each group. Most of the participants

were from NGOs and community groups and some were from the city.

The workshop covered the basic concept of composting, its potential economic, social and environmental impacts, and actual hands-on training to produce seed compost. A model for a household compost basket was purchased at a local market and displayed as a sample. Prior to that, Cebu City and Pagtambayayong Foundation sent two (2) officers to Bago to learn how to ferment local micro-organisms and produce seed compost. Necessary raw materials, such as sacks of rice husks, rice bran, mud-press and fermented local micro-organism, were prepared for the workshop. However, it was noted that those raw materials are not easily available in Cebu as it is a commercial centre compared to predominantly agricultural Bago, where all of raw materials are freely available. To address that resource constraint, usage of pruned tree twigs and leaves was proposed to substitute such materials, which are successfully practiced in Surabaya, Indonesia.

Many participants seem to be interested in household composting practice as they are mostly from community groups. It is expected that Pagtambayayong Foundation or any some other organisation will be a centre for that by producing and supplying seed composts. For the household compost basket production and distribution, financial support from the City is expected to induce larger impact. It was observed that there are ideal bamboo baskets available in local markets which could be produced in bulk as there are many producers of such goods in Cebu.

The amount of market organic waste generation in Cebu is around 30-40t a day. According to city officers, most of these wastes are shredded before transported to a disposal site. Therefore, as long as there is space available for composting, it can be started immediately. Mr. Dionisio Gualiza, Director of Public Service Office (PSO) and Mr. Noli Tenefrancia, Agriculture Office, Cebu City, both of whom attended the workshop in Cebu as well as the one in Bago, are aiming to develop a plan for establishing a market waste composting centre. The impact will be huge in Cebu if that market waste could be converted to organic compost and utilised for agricultural production rather than just disposed of at a disposal site.

Another positive sign in Cebu was that the Pagtambayayong Foundation found the idea of starting a composting centre by accepting market organic waste from the city a viable option for them as they have an unused building, which can be converted to

a composting centre. The building has a water supply and electricity connection as well as enough space for composting as well as being located a 30-minute drive west from the city centre. Once transportation arrangement of shredded market organic waste to the building was made by the city, or a shredder and daily supply of raw market organic waste are provided, it seems the operation can be started immediately. Pagtambayayong Foundation is specialised in assisting resettlement and housing development for low-income groups and slum dwellers and intends to take advantage of the composting centre for provision of direct job opportunities as well as income generation for poor-income groups through plant nursing by using produced organic composts. They also intend to use the composting centre for training purposes as they have other training and accommodation facilities in the same area.

As seen here, expectation and potential for realising a wide-spread composting practice in Cebu City is high as key city officials, including the Administrator, City Planning and Development Department, Public Service Office and Agricultural Department, are all involved together with serious NGOs and community groups.

Bacolod City

The workshop in Bacolod City took place with the strong support of Mr. Greg Gasataya, a Councillor of Bacolod City, who is heading a waste management campaign in the city. The workshop was held in a conference room of the League of Barangays in Bacolod and the morning session covered basic concepts of composting and its economic as well as social and environmental impacts. In the afternoon, a hands-on composting training session was held in the South Terminal where a vacant building is available managed by the Agricultural Department, Bacolod City. A space in the building was identified and allocated for a potential composting centre by Mr. Gasataya, which is only 15-minute drive from the city centre, after a request by IGES during a visit in April 2008.

There were around 70 participants mostly consisting of representatives from each barangay and city officials. Production of seed compost using local materials was demonstrated to the participants with support from Bago City in the form of Eco Centre staff and raw materials. The main concerns of barangay representatives seem to be application of household compost practices.

A problem identified in Bacolod City was that, although concerned city officers participated in the workshop from the Agricultural Department, Public Service Department and Environmental Department, it was not clearly defined who would take the initiative to implement the market waste composting practice. As a result, it turned out that all the demonstrated seed compost, which required proper management for a week to keep in good condition, decayed after few days because nobody took care of it. It was communicated that this problem had been resolved by an arrangement made by Mr. Gasataya afterwards. A lesson from this incident is that a similar case could happen in other cities and to avoid that, clear demarcation of roles and responsibilities among concerned departments before implementation of the project is essential, as usual, there are several related departments covering market organic waste and household waste.

Bacolod City generates around five (5) tons of market organic waste a day, which currently all ends up in an open dumpsite. The impact of converting this waste into useful products would be financially as well as environmentally beneficial for the city. It is expected that a successful case in Bago would be stimulated and be transferred to neighbouring Bacolod.

Comparison with Vermi Compost

Vermi composting has been practiced at Eco Centre in Bago City for few years utilising market organic waste. Market organic waste has to be shredded and the moisture content and acidity has to be adjusted by running the waste through a rotating machine for few days – which requires power supply – followed by a storage period of about a month before feeding it to the worms. The productivity is low as the worms can be fed only twice a month. As a result, most of collected market organic waste used to be shredded and left over around the Eco Centre. The production of vermi compost is around 600kg a month, which occupies an area of around 80m^2. Assuming the market price of vermi compost is around five Peso (0.11 USD)/kg, expected income is around 3,000 Peso (66 USD) a month.

Compared to that, Takakura compost method can covert market organic waste to compost every day once there is sufficient stock of seed compost ready. Assuming one (1) ton a day of market organic waste is shredded together with the same amount of seed compost and piled up in a heap every day, there will be eight (8) heaps, including

one (1) spare, each week. These will occupy an area of around 130m^2 (= 16m^2 each times eight (8) heaps). The production of compost by that method would be around 200kg a day, or 6 tons a month, which could bring in 30,000 Peso (660 USD) a month, assuming 20% of organic waste input becomes a final compost product. Clearly, Takakura method has much larger productivity than vermi compost method. A comparison of two cases is given in the following table:

Table-1 Comparison of vermi and Takakura compost methods

	Vermi compost	Takakura compost
Area	80m^2	130m^2
Organic waste input	0.1t/d (= 3.0t/m)	1t/d (= 30t/m)
Compost produced*	0.6t/m	6t/m
Compost produced/ area	8kg/m^2	46kg/m^2
Potential income	3,000 Peso (66 USD)/m	30,000 Peso (660 USD)/m
Necessary equipment	Shredder & rotating machine	Shredder

** Assuming compost produced is 20% of organic waste input.*

It is known that organic compost which utilises local micro-organism such as lactic acid bacteria like the one used in the Takakura method contains active bacteria that has functions to 1) improve soil condition by retaining soil particles and making it softer at the same time and 2) enhance resistibility of plants against diseases by assisting absorption of essential elements in the soil and hormones for their growth.

Eco Centre in Bago City continues practicing both composting methods and actual performing differences will be reported accordingly.

Marketability of Compost

Quality compost is marketable, as practiced by Pusdakota, an NGO that collects organic waste from around 1,000 households in Surabaya, Indonesia. Pusdakota sells composts at around 700 Rupees (0.07 USD)/kg to private companies. On the other hand, one private company in Bago which produces compost from mud-press with other ingredients such as residual of processed cassava, chicken droppings, lime, calcium, magnesium and dolomite, sells the product at 4.8 Pesos (0.1 USD)/kg including delivery cost to buyers. Based on those facts, it is assumed that quality

organic compost can be marketable at around 70-100 USD per ton.

According to a news article dated 8 April 2008, the imported inorganic fertiliser price in the Philippines doubled in one year from 14,000 Pesos (350 USD)/t to 28,000 Pesos (700 USD)/t due to the price hike in crude oil[1]. Compared to that price, the price of organic compost at 70-100 USD/t looks reasonable.

Business Model of a Composting Centre

Three business model cases of composting centres are given below for Bago, Bacolod and Cebu respectively, to examine the feasibility of each case. This is assuming shredders and spaces for composting centres are available. Productivity and costs are based on actual case studies in Surabaya:

Table-2 Business models of composting centres

	Bago	Bacolod	Cebu
Organic waste input	1t/d (= 30t/m)	5t/d (= 150t/m)	30t/d (= 900t/m)
Compost production	6t/m	30t/m	180t/m
Income (70 USD/t)	420 USD/m	2,100 USD/m	12,600 USD/m
Expenditure	No additional cost	700 USD/m	4,200 USD/m
Profit	420 USD/m	1,400 USD/m	8,400 USD/m
Necessary space	150m^2 (Eco Centre)	300m^2 (South Terminal)	300m^2 x 6
Number of workers	3 workers	6 workers	36 workers

As given in the table, composting is a profitable business alone – providing quality and marketable compost is produced and spaces for composting centres are available – without counting the environmental benefits and the money saved by reduction of waste transportation to a disposal site.

[1] "The imported inorganic fertilizer price doubled in one year's time from 700 pesos (17.5 U.S. dollars) one bag weighing 50 kg to 1,400 pesos (35 U.S. dollars), as chemical fertilizers are made with oil whose price is also soaring", downloaded on 10 June 2008 at *http://news.xinhuanet.com/english/2008-04/08/content_7939639.htm*.

(5) Follow-up

Bago City

- It is expected that by end of June 2008, market waste composting at Eco Centre will be operational by accepting 0.5t of waste every day. Household compost baskets are distributed and being used in 50 households.
- By the end of July 2008, it is expected that 1t of market organic waste will be composted every day with a total of 100 households using household compost baskets. The result will be confirmed by a field visit.
- By the end of January 2009, it is expected that Eco Centre will be making a profit by selling the compost, with more than 300 households using household compost baskets. By doing so, Bago city will achieve a 20% reduction of waste transported to a disposal site in terms of volume and number of trips by trucks compared to baseline data in June 2008.

Bacolod City

- By the end of July 2008, it is expected that the City will initiate a composting centre at the South Terminal with clear assignment to a certain department. 50 households will have started using household compost baskets.

Cebu City

- By the end of July 2008, it is expected that the City will initiate a composting centre under Public Service Office (PSO) and Pagtambayayong Foundation also will initiate a composting centre near their training facility in cooperation with the City.
- By the end of July 2008, it is expected many NGOs and community groups, which participated in the workshop, will initiate the household composting practice in their community with assistance from the City.

(6) Takakura Compost Methods

There are three (3) types of Takakura compost methods, which correspond to types of waste and location as follows:

Types of waste	Method	Composting site
A. Household waste	Takakura Home Method (THM)	Each household

B. Collective household waste	Takakura Susun Method and new open windrow method	Compost centre
C. Market organic waste	New open windrow method	Compost centre

The basic concept of Takakura methods is to use locally available micro-organism to ferment organic waste. To do so, it collects and grows/ferments micro-organism such as lactic acid bacteria from locally available foods, such as fruit and vegetable peels and fermented foods like yoghurt, local soy sauce and local wines (and tempe and tape in Indonesia). These are then mixed with rice bran and rice husks to allow them to grow/ferment more for a week or two, and applied to shredded organic waste to produce compost. A prominent feature of these methods is that they do not require any foreign materials but rely on only locally available ones.

In order to produce compost from organic material, in general, there are two ways to do so as shown in Fig-1: either through rotting or fermenting. When foods rot, it emits an offensive smell and attracts flies and maggots. In contrast, when foods ferment, it does not smell bad but rather, smells like fermented foods and pickles. Both methods produce compost. However, the basic idea of Takakura methods is to promote the latter case by supplying micro-organism, which were prepared separately and avoid rotting.

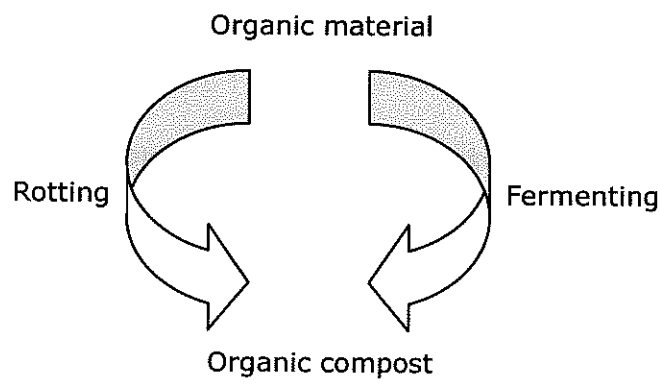


Fig-1 Two ways to produce compost from organic material

Basic flow of Takakura compost methods are given below:

Collection and growing/fermenting micro-organism from local foods:

1) Soak fruit and vegetable peels in salted water in a 0.5-1.0 litre container for three

(3) days. It smells like pickles as a micro-organism like lactic acid bacteria grows. Salted water functions to prevent the growth of unwanted bacteria.

2) Mix fermented foods such as yoghurt, local soy sauce and local wines in water with brown sugar in a 15-20 litre container for three (3) days. It gives off alcoholic and fermenting smells when a micro-organism like lactic acid bacteria grows.
3) After three (3) days, "native micro-organism (NM)" is ready.
   Further growing/fermentation of micro-organism in mixture of rice bran and rice husks:
4) Sprinkle 1) and 2) on mixture of five (5) sacks each of rice bran and rice husks (and mud-press, if available; or pruned twigs or leaves, after shredding, if none of them are available), and mix them well. Adjust the moisture content as appropriate.
5) Pile it up in a 1m-height heap, cover it with a black synthetic cloth or a mat that allows aeration but prevents contact by flies and leave it for a week for fermentation. Mix it up once a day to allow aeration and to prevent too much heat accumulation inside the heap. Adjust the moisture content when mixing. The volume of a heap becomes less day by day as fermentation takes place.
6) After a week, this "seed compost" is ready. It is full of micro-organisms that promote fermentation of organic waste. Processes 1) to 6) have to be repeated 7-8 times to accept market organic waste every day as one heap of seed compost is good for one batch of market organic waste and takes a week to ferment.

Application to organic waste:

A. Household organic waste

A-1) Put about 50 litre of seed compost in a basket which has holes for aeration and mix it well with shredded kitchen waste. Continue the practice after every meal. Organic waste decomposes in a week.

B. Collective household organic waste

B-1) Mix collected household organic waste with seed compost on one to one ratio and pile it up in baskets for a few days to allow aeration. This process is essential to dispel unwanted bacteria, which could be growing on days-old collected household organic waste.

B-2) Shred B-1) and pile it up in a heap. After a week of processes 5) and 6), the compost is ready.

C. Market organic waste

C-1) Mix market organic waste and seed compost on one to one ratio, shred it, pile it up in a heap. After a week of processes 5) and 6), the compost is ready.

How to use the compost:

7) Since the fermentation is premature and the micro-organisms in it are still active after only one week, it is recommended to mix the compost with soil for 1-2 weeks before applying to plants. The mixed soil shall not be applied deep in soil, as active micro-organisms require an adequate oxygen supply. Compost produced by household compost baskets should be left for two (2) weeks before applying to plants as it may contain fresh kitchen waste that has not yet decomposed.

Ⅳ. Presentation

(1) **Basic Concept of Composting**

(2) **Evaluation of composting activities for market and community waste**

(3) **Economic and Political Analysis of Composting**

（1）Basic Concept of Composting

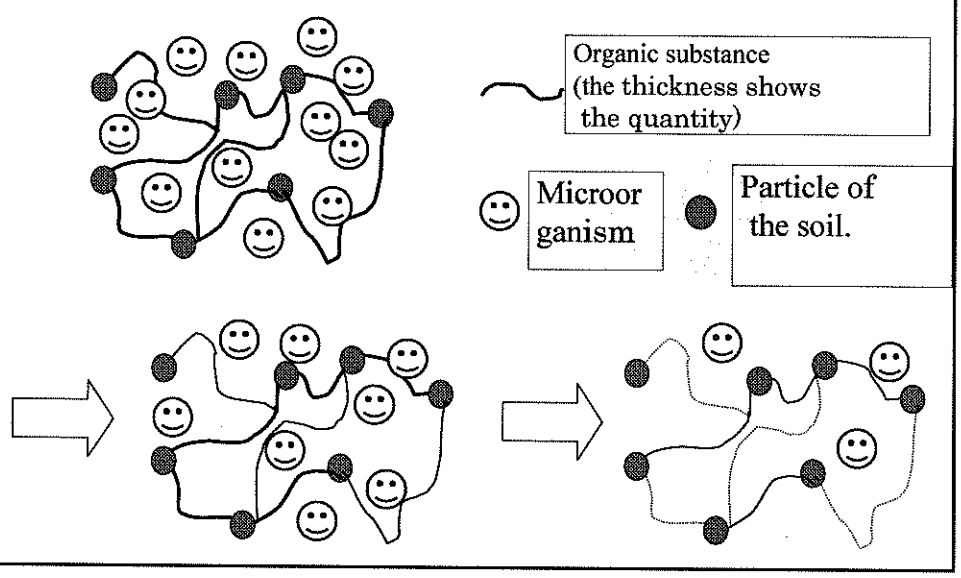
Basic concept of composting

05. 2008

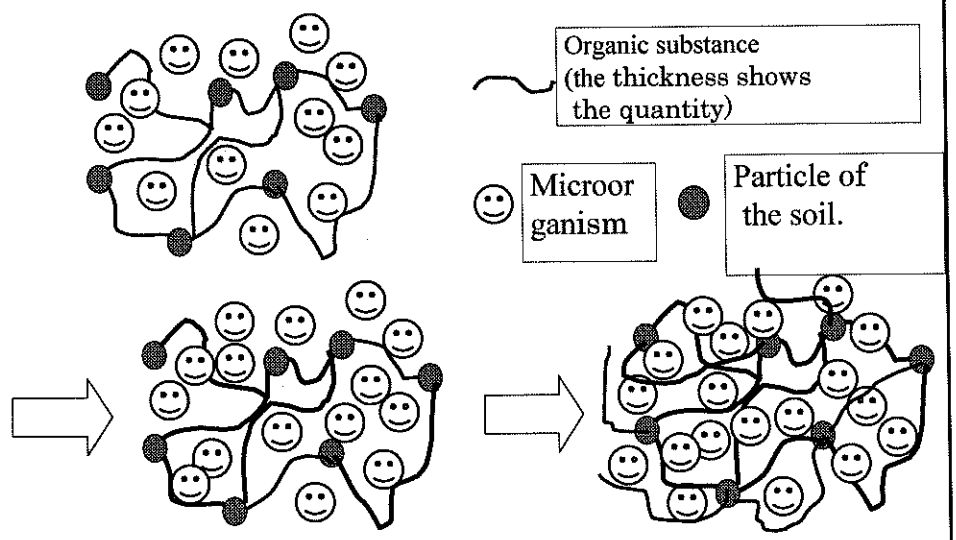
JPec CO.,Ltd.

J-POWER Group

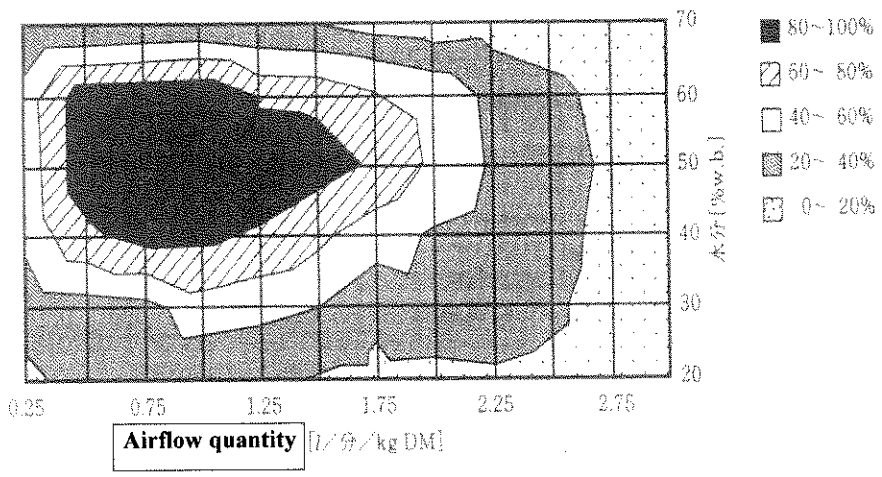
The fertilization only of the chemical fertilizer.



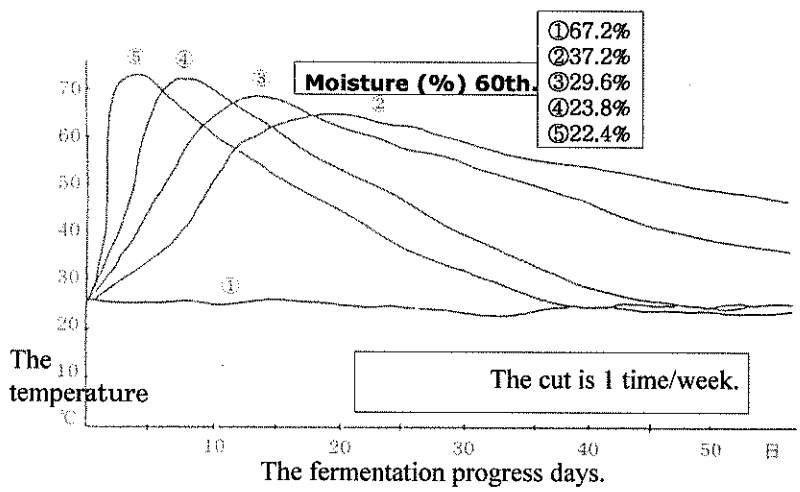
The compost also fertilizes it.



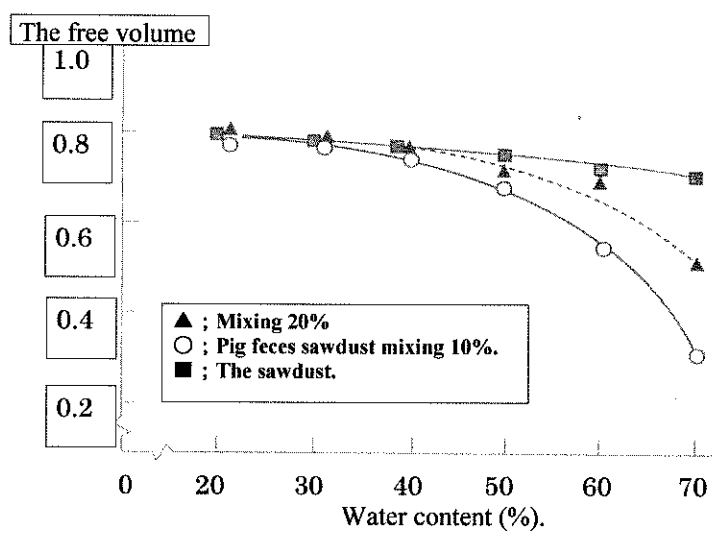
The effect of moisture on high-temperature achievement ratio and airflow quantity.



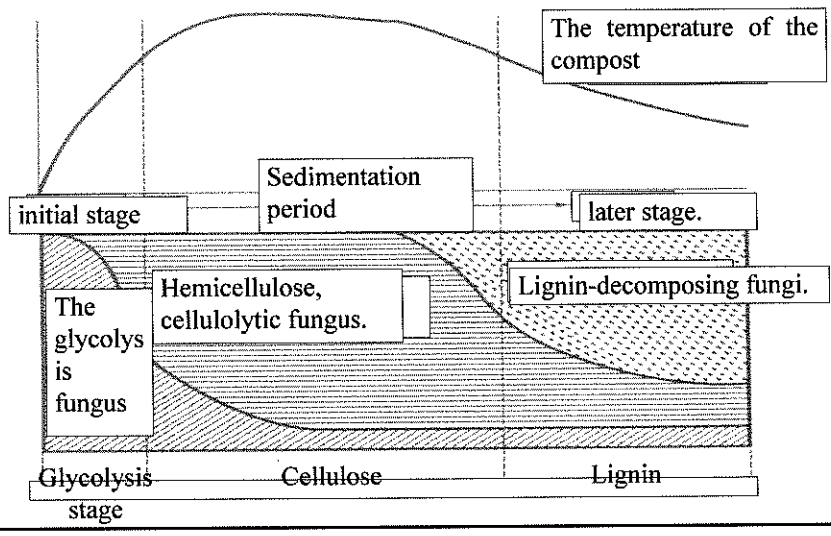
The change of pig feces fermentation temperature adjusted in the material variously at the specific gravity.



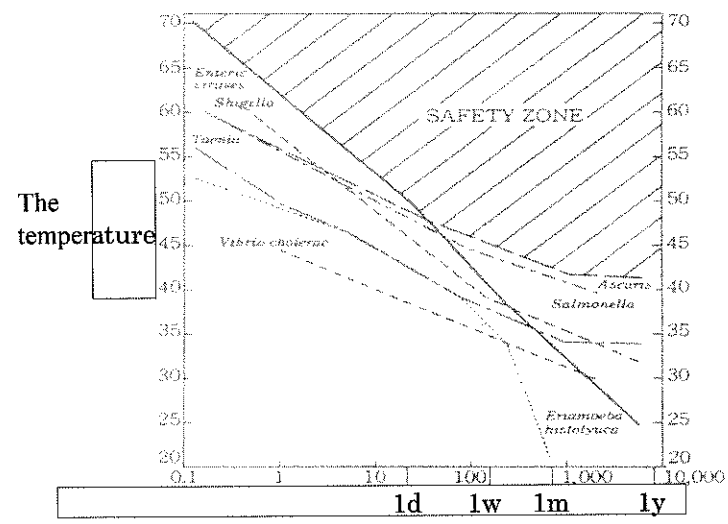
The effect of the sawdust mixing on the free volume of the pig feces.



the schema of the microbial change of the composting.



the relationship between temperature and for the pathogenic fungi extinction hour.



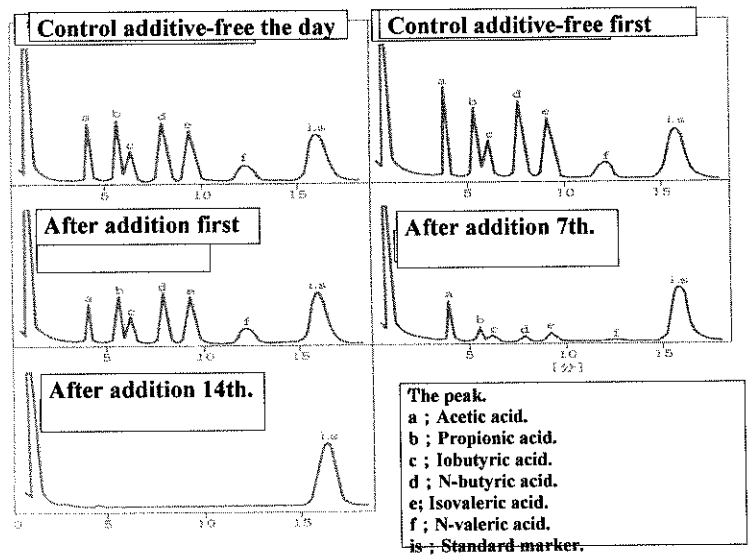
pathogenic fungi and death-temperature of the parasite.

The type	temperature (℃)	The time (minute)
The Salmonella typhi	55～60	30
The dysentery bacillus	55	60
The staphylococcus	50	10
A Escherichia coli	55	60
	60	15～20
The roundworm (egg)	60	15～20
The Cryptosporidium	60	30
	The ordinary-temperature drying drying	1～4days

The germinating rate of weed seed of the cattle dung buried work compost

The type	The buried work condition.		The control
	Under 50℃.	For the 60℃ 2day.	
The crabgrass.	96	0	74
The Nobie	72	0	87
The umbrella sedge.	56	0	30
The Ooinutade	8	0	53
The inubiyu	68	0	70

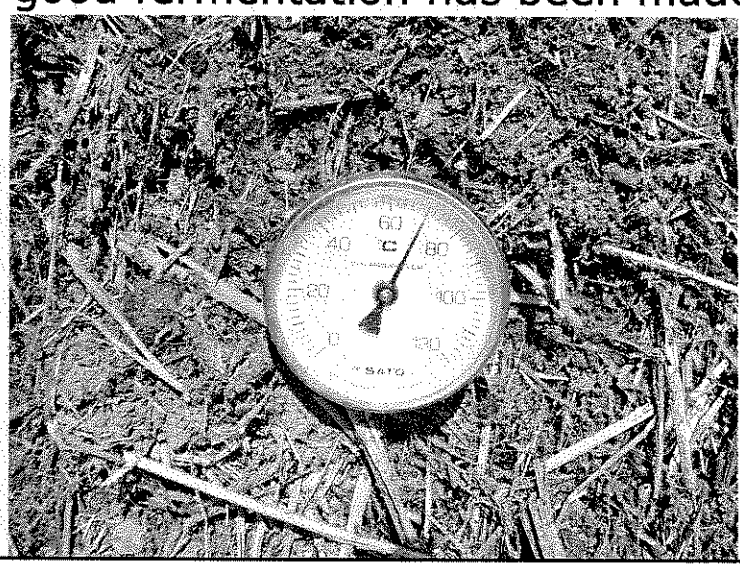
the exception odor effect of the lower fatty acid of photosynthetic bacteria.



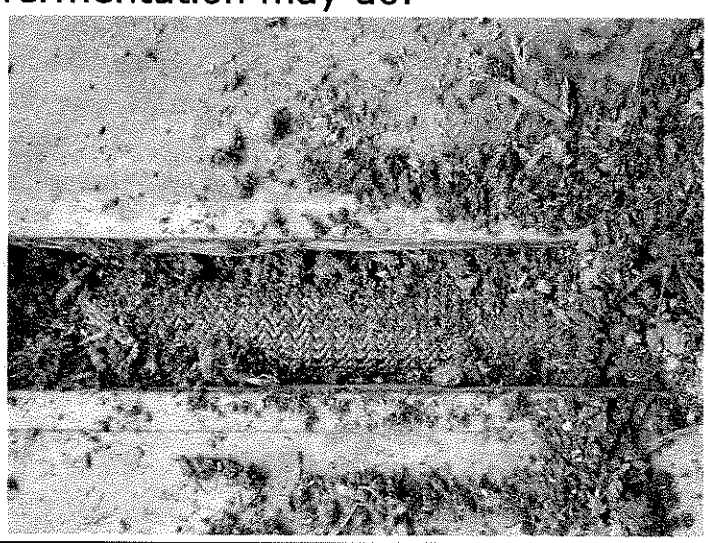
(1) The composting technology case.

①The composting of the cattle dung.

The fermentation temperature of the primary tank shows 70℃, and the good fermentation has been made.

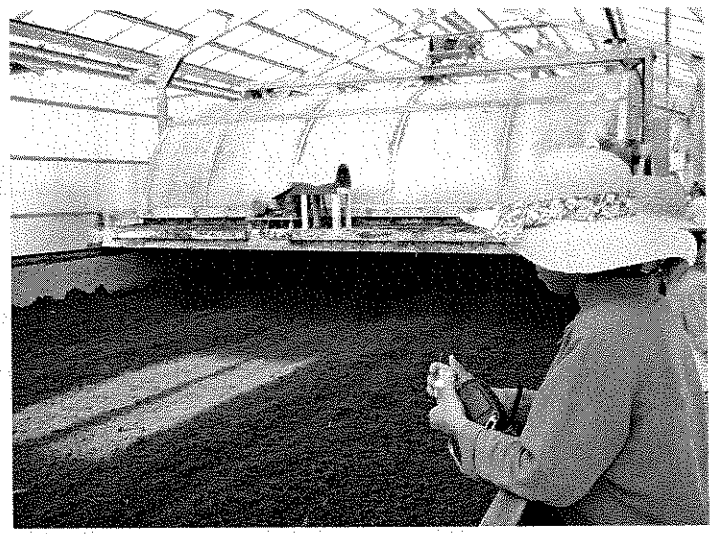


The supply of the fresh air (oxygen) is supplied from fermenter bottom face vent pipe by the blower so that the good fermentation may do.



It is transferred to the open-type paddle method fermentor, after the sedimentation fermentation ends by the fourth tank, in order to make the good compost.

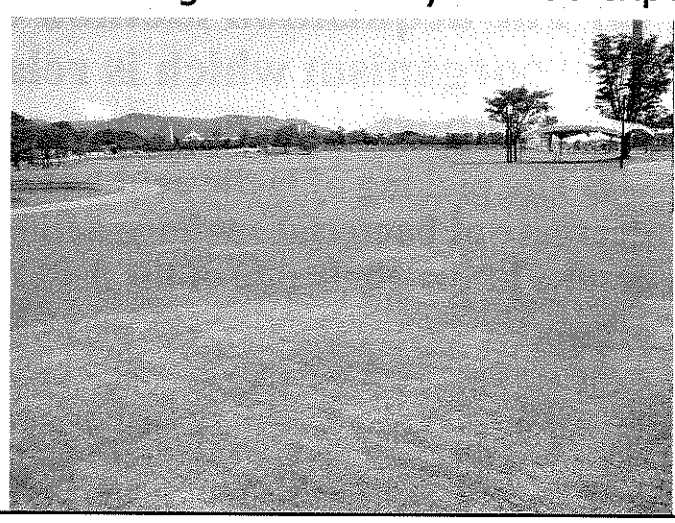
there is no enforcement ventilation by the blower. The air is supplied by the agitation of 1 time/day.



(2) The acquisition method of the microorganism which is related to the compost.

① The picking from the nature.

From the soil such as flower bed and grass site which uses chemical pesticide commonly and chemical fertilizer, the picking of the useful microorganism hardly can be expected.



The picking of the effective microorganism from the plantation of single species such as cedar and hinoki can be expected. However, the type will be limited.

(2) The acquisition method of the microorganism which is related to the compost.

② The picking of lactic acid bacteria with decrease of bacterial spoilage action with results in the challenge of the J-POWER group.

In Japan, lactic acid bacteria lives for the rice bran. This effectively affects first fermentation in the source and afterwards composting as decrease of bacterial spoilage.

(2) The acquisition method of the microorganism which is related to the compost.

③ The purchase from vendors such as the do-it-yourself store.

It is possible to utilize the microorganism which lives for it, if it is the good compost, by judging from colors and smells (perfume), etc.

(2) The acquisition method of the microorganism which is related to the compost.

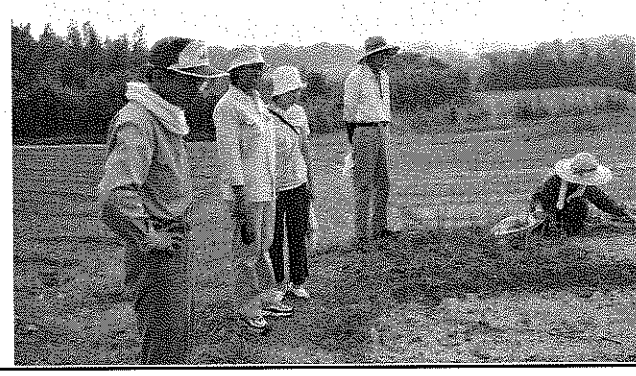
④ The application of the traditional fermented food.

There are miso, sake lees, bran floors, soy sauce, yoghurt, malted rice for the amazake, etc..

(2) The acquisition method of the microorganism which is related to the compost.

⑤ Paddy field and field soil of the organic forming farmhouse.

It continues, and the organic forming farmhouse fertilizes the good compost to paddy field and field. The effective microorganism for large number of composting in this soil lives.

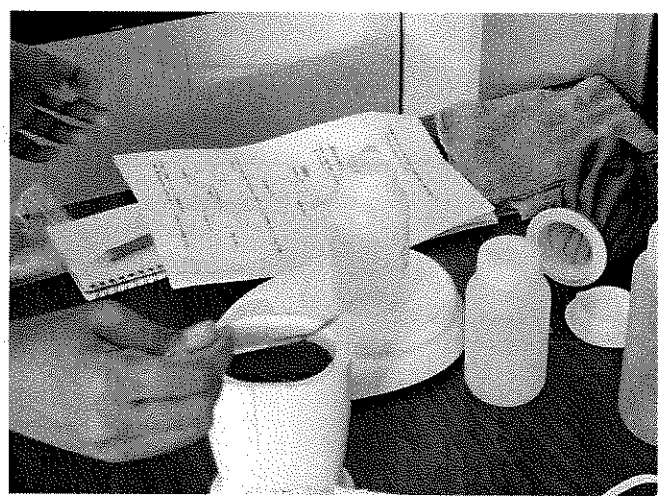


(3) The quality assesment test of the compost.

① The seedling assay.

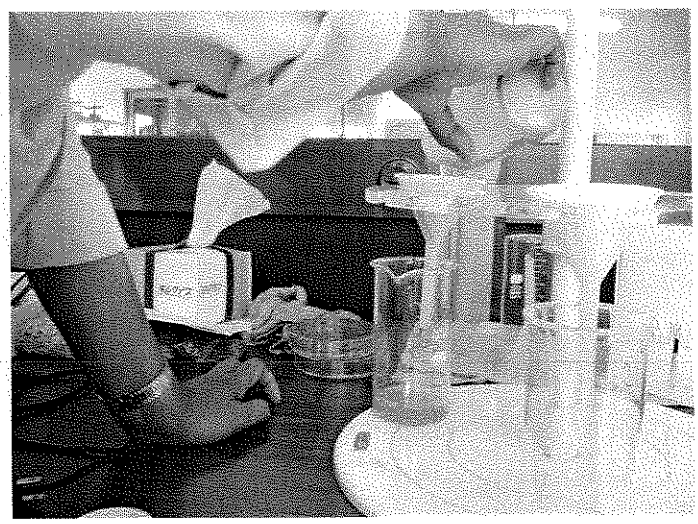
The compost is collected, and it airs as a half day. The bulky thing is made fine by the pair of scissors.

It puts grinding compost 5g and boiling water 95ml in the poly container, and then, it mixes.

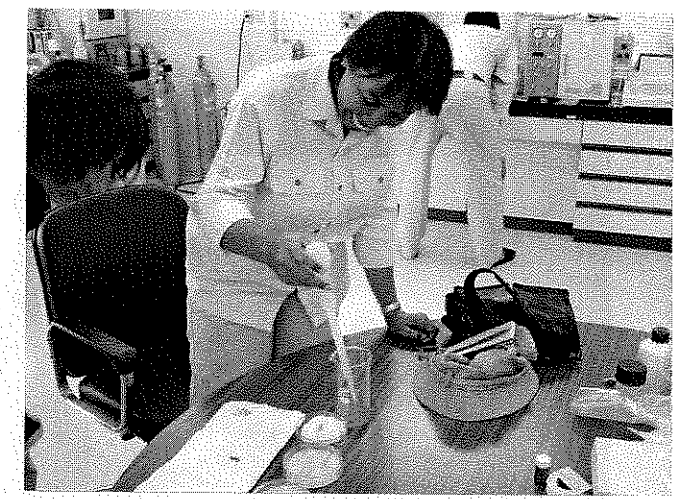


The shaking of the poly container is done for intense 1 minute, and 10 minutes are stood. These are repeated to 3 times.

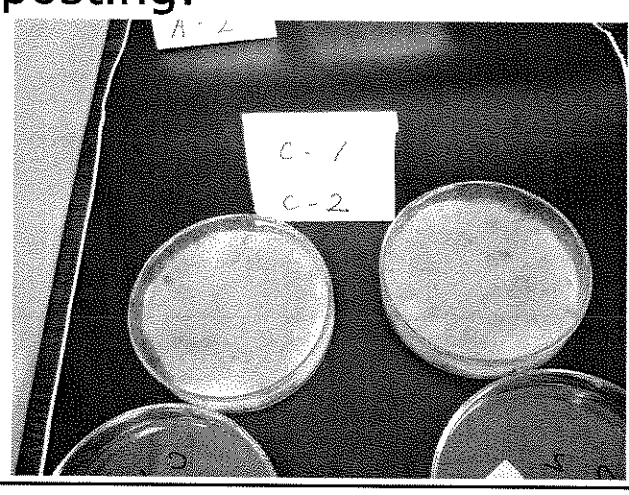
After the filtration, the filtrate is made to be the compost extraction liquid.



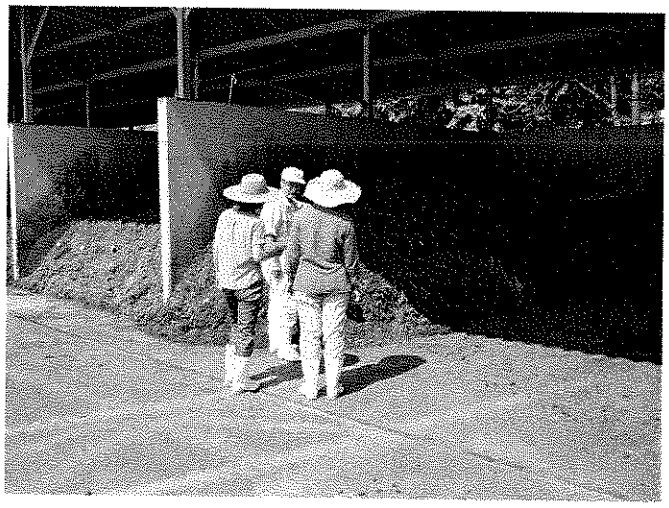
It puts compost extraction liquid 10ml in the Schale, and 15 seeds of the Komatsu vegetable are put.

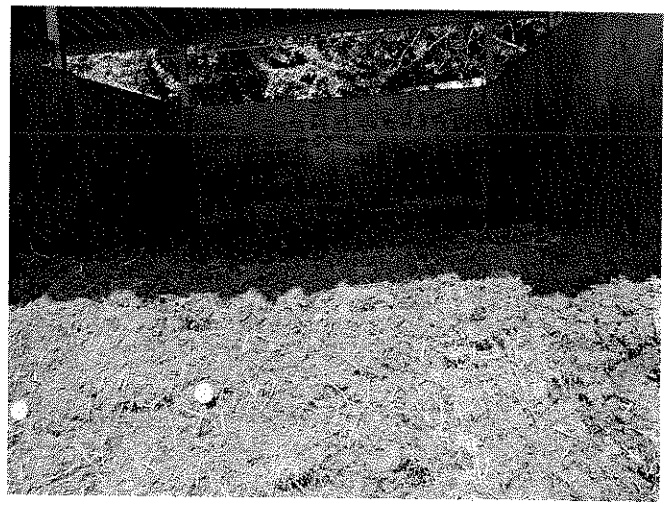


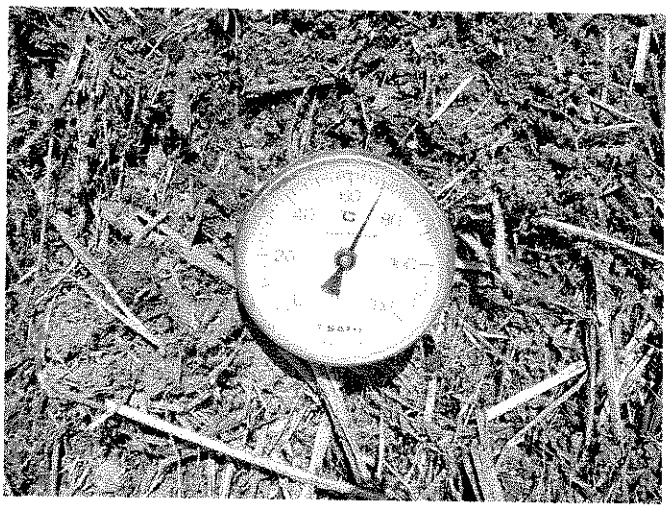
After second, The mold grows on the compost of No. C, and it is proven to be a middle point of the composting.

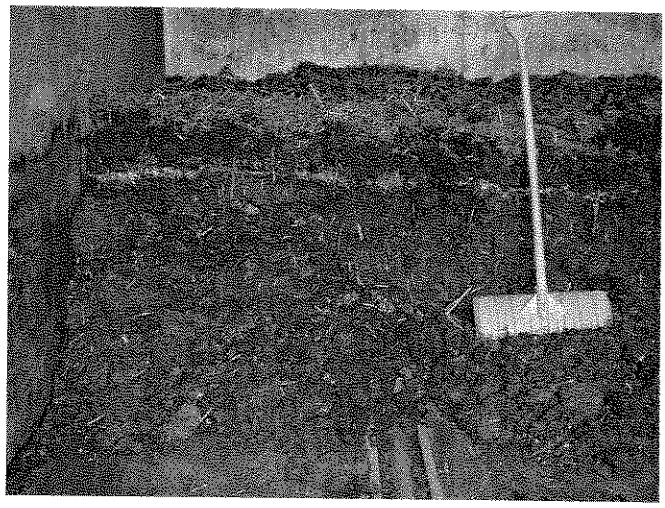


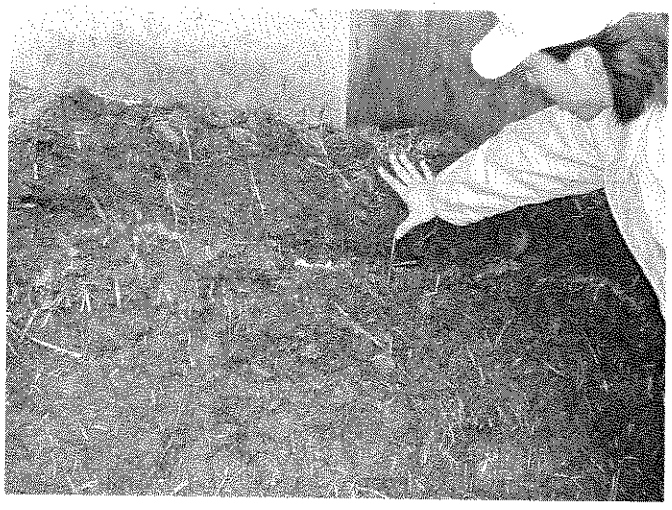
It is after seventh, and No. A and No. B compost are germination number and growth which are bigger than the distilled water (control).

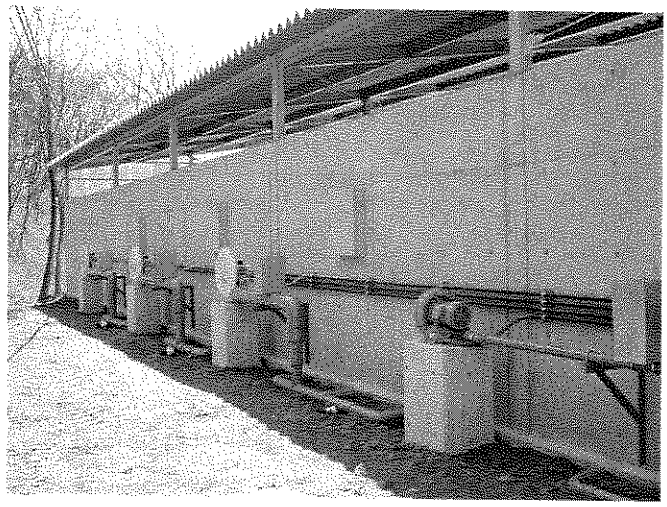


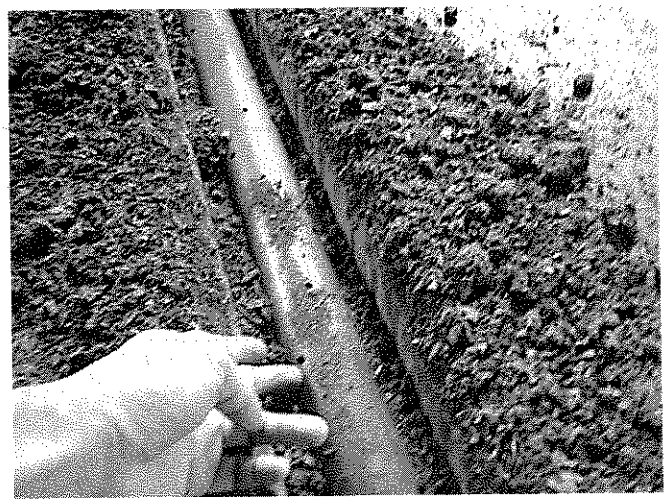


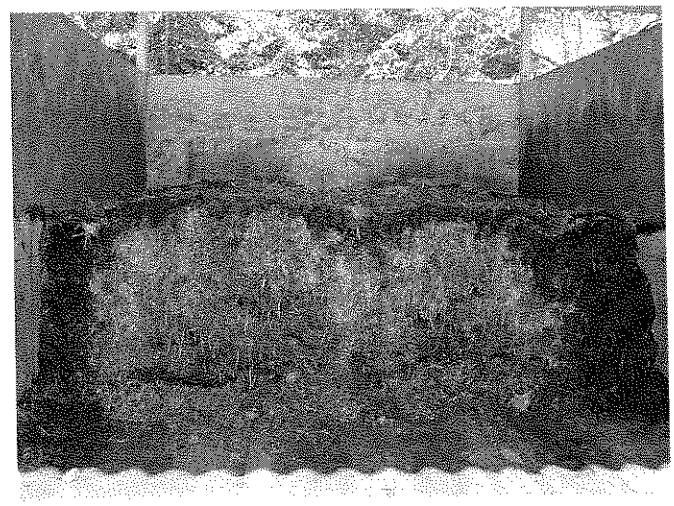












（2）Evaluation of composting activities for market and community waste

Evaluation of composting activities for market and community waste

05. 2008

JPec Co., Ltd
Wakamatsu Environment Research Institute
Koji Takakura

Who makes compost?

- It's a natural process ✗
- It's automatically made by machines ✗
- Only heaven knows
- It's sold in shopping centers ✗
- It's made by people+ microorganisms ◎

Cooperation between humans and microorganisms is critical

Is it necessary to use special kinds of microorganisms?

- Are they brought in from Japan?
- Are they made through university R&D?
- Are they made through business R&D?
- Do they cost a lot of money?

No

They are microorganisms that are present in your own areas.

In Philippine

Tuba,

Fruits, Vegetables

Native Microorgnisms (NM)

Il necessary materials are procured locally.

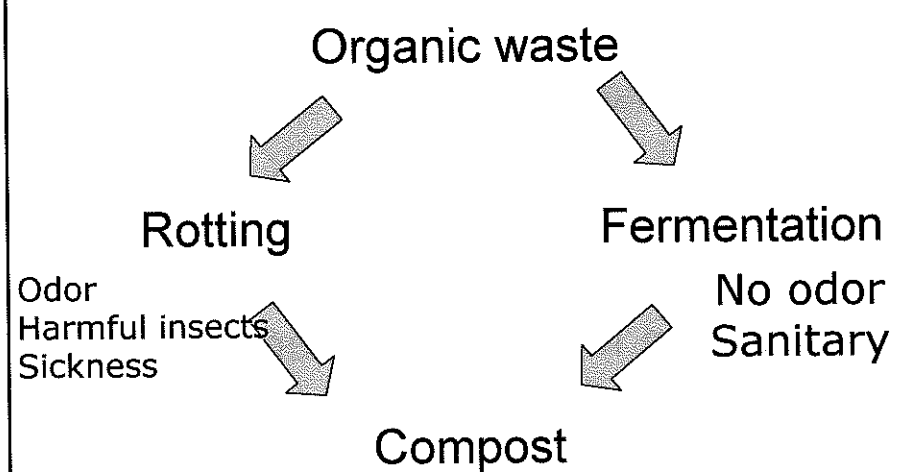
Notes about composting

- Waste is made small.
- Moisture content (40~60%)
- Oxygen supply
- Increase in fermentation temperature
- Fermentation

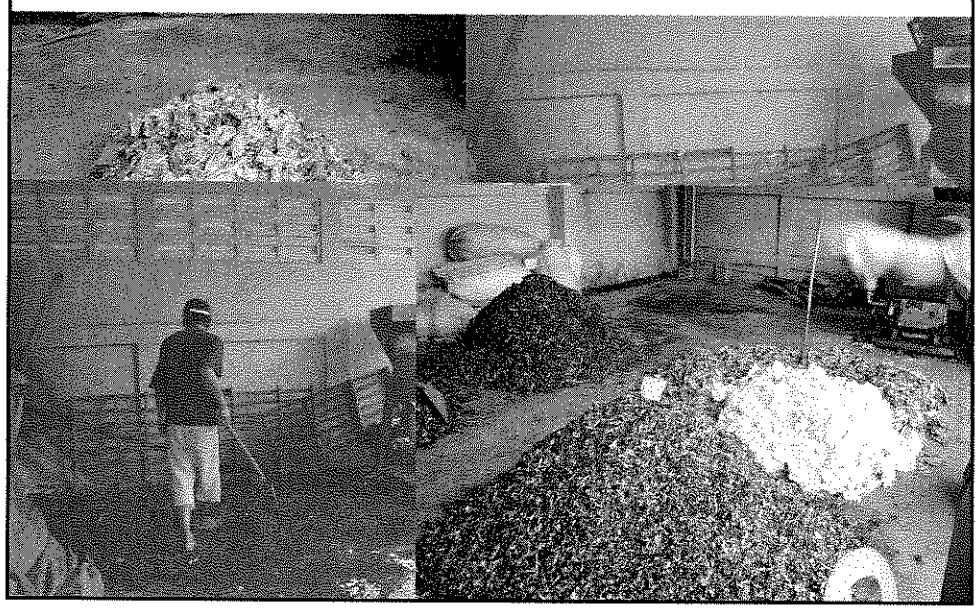
Development of compost

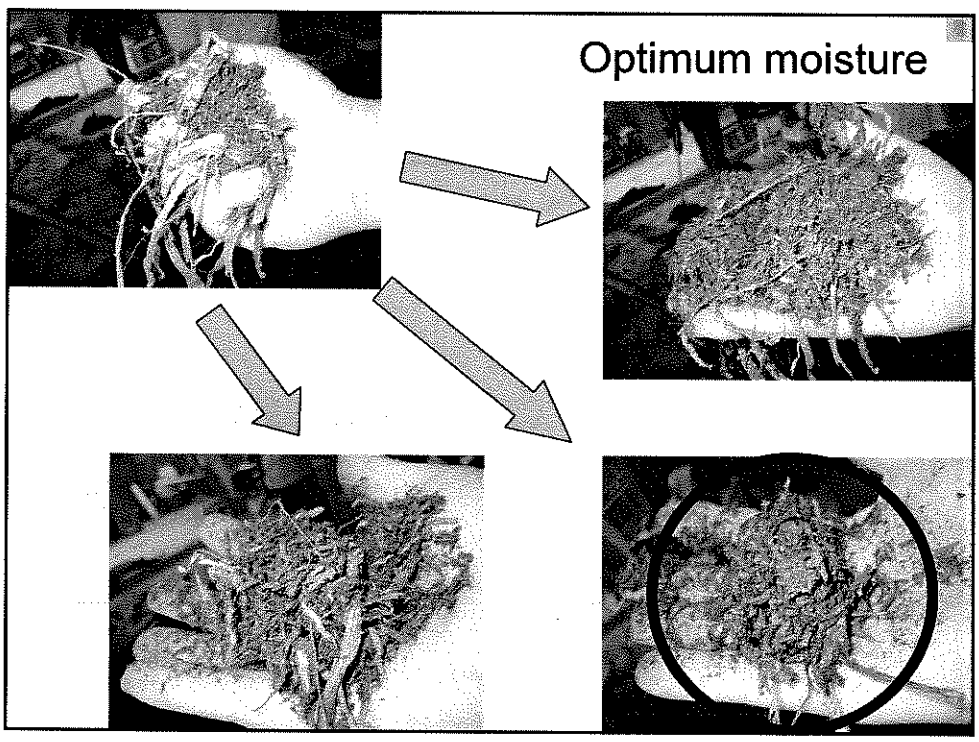
- Flies, cockroaches, and maggots cannot breed
- No odor
- Simple technology
- Low cost
- Low energy, etc.

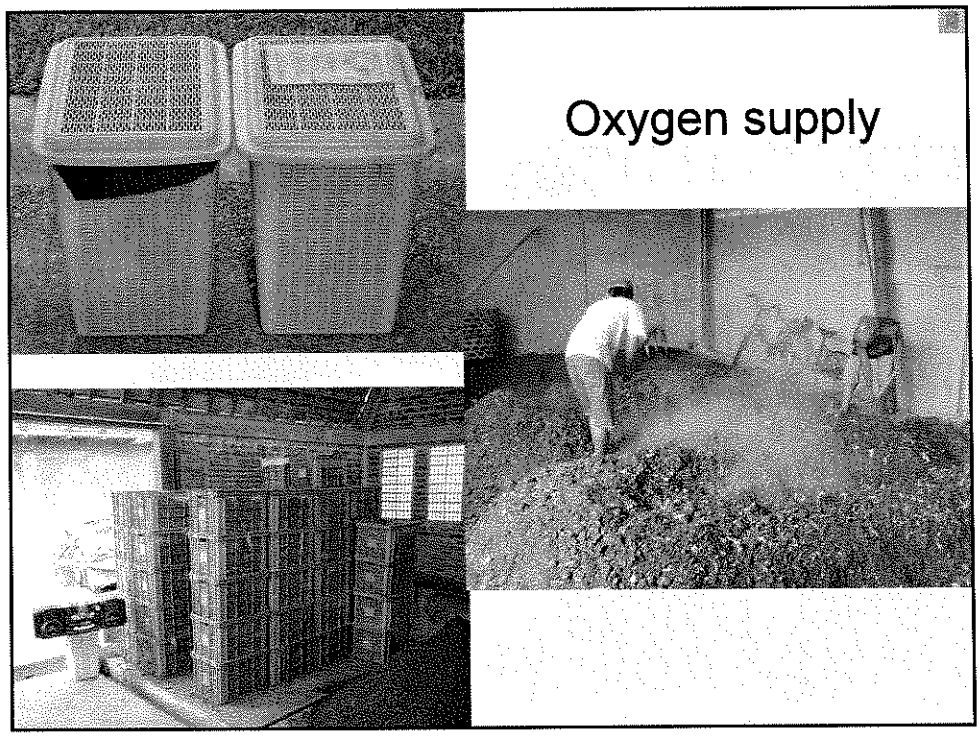
Compost fermentation

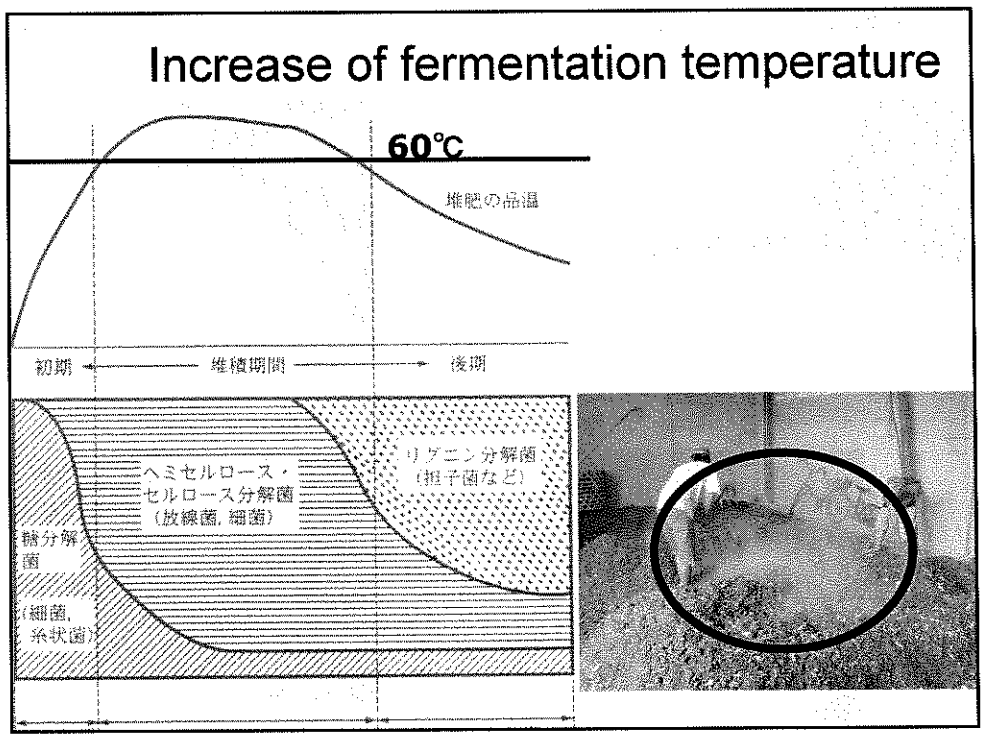


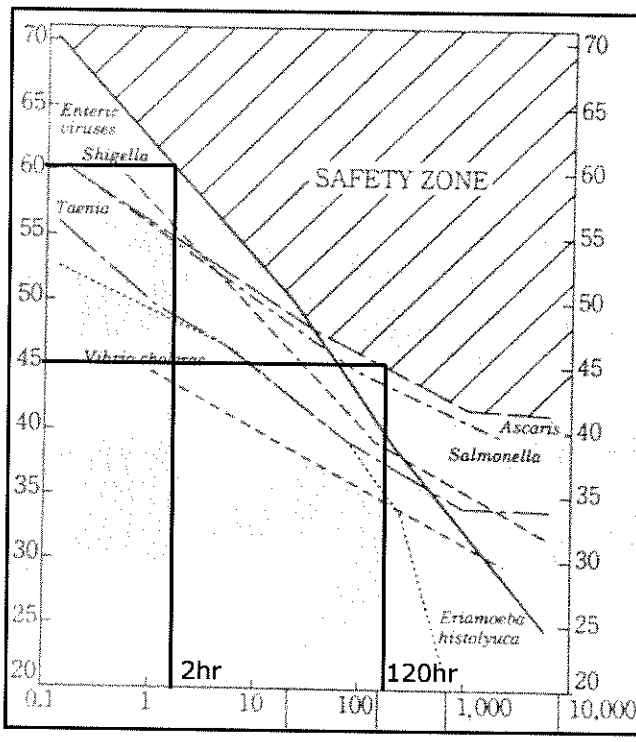
Cutting of waste





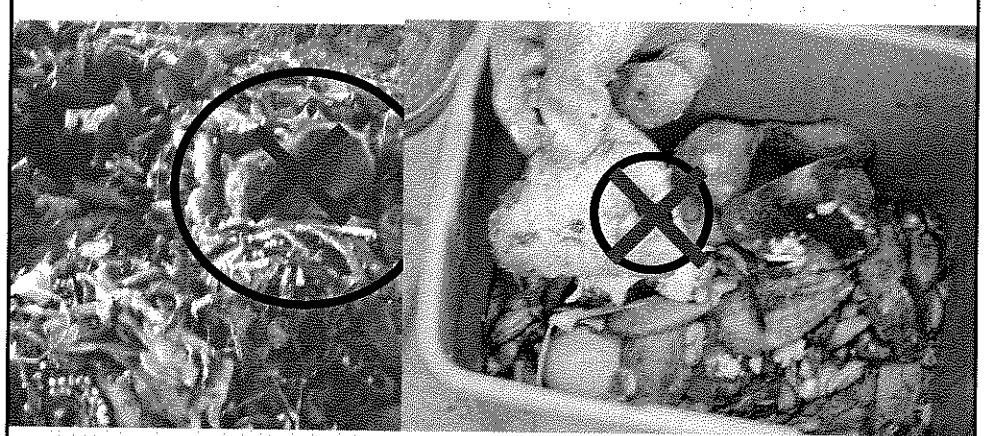

Oxygen supply


Increase of fermentation temperature
60℃
堆肥の品温
初期
維持期間
後期
ヘミセルロース・
セルロース分解菌
（放線菌，細菌）
リグニン分解菌
（担子菌など）
糖分解
菌
（細菌，
糸状菌）

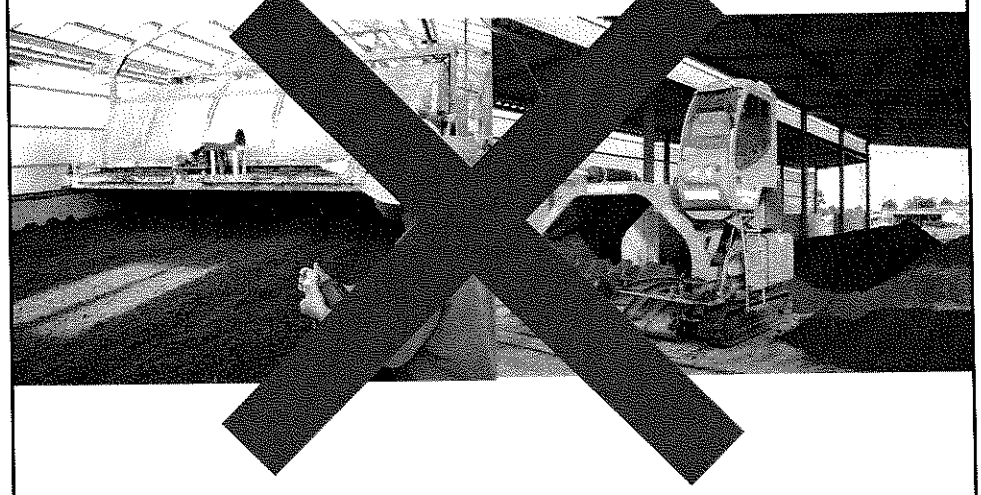


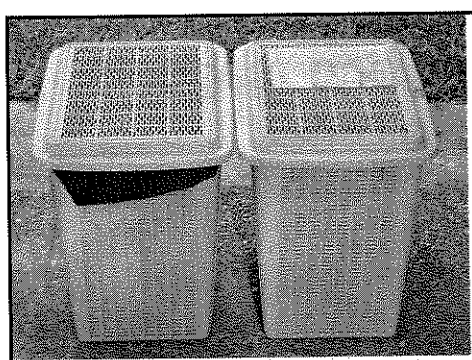
Increase in fermentation temperature

Flies, cockroaches, and maggots are unable to breed

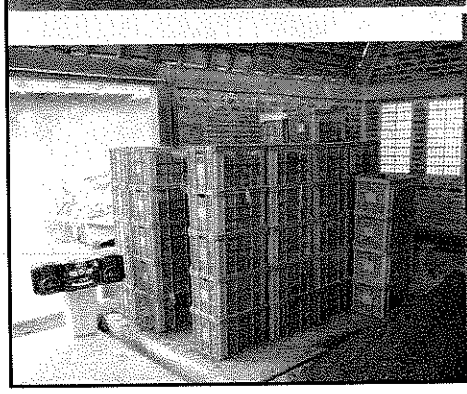


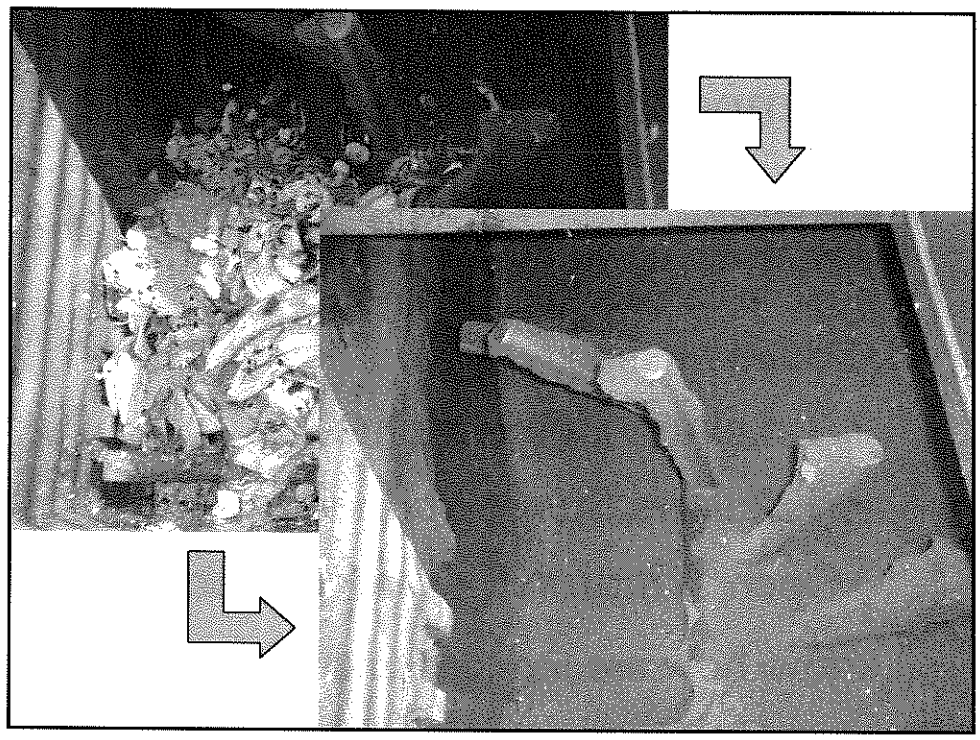
Low cost, Low energy Simple technology?

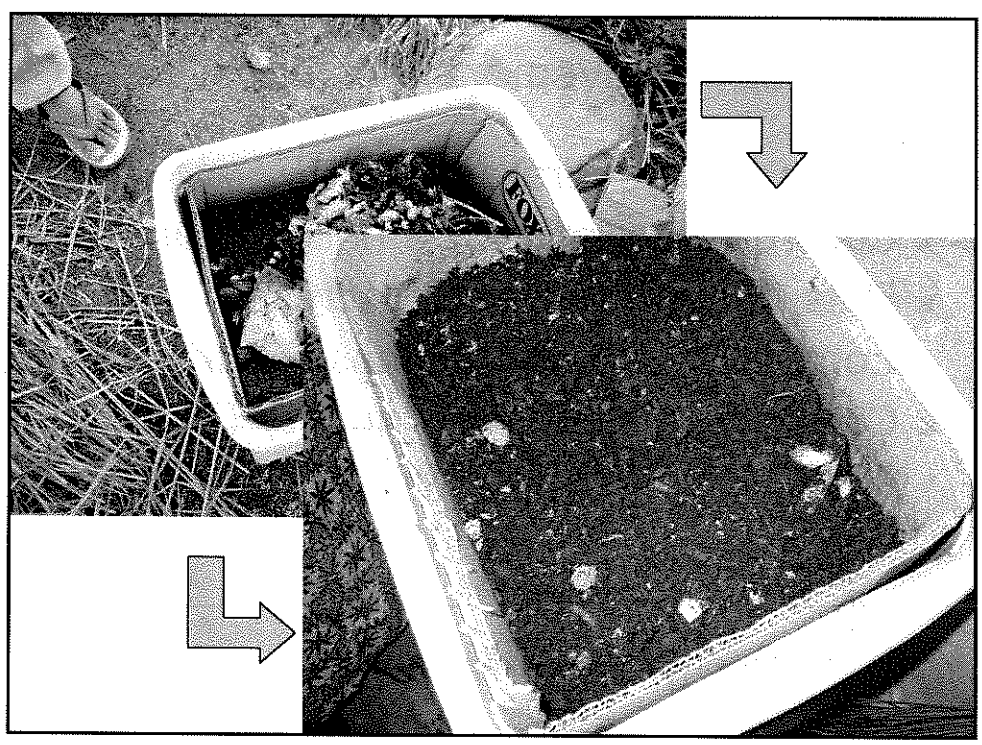




Low cost
Low energy
Simple technology







Composting seems difficult…

No problem.

We've come up with a simple method that anyone can do. It's called the…

Takakura Method

- Takakura Home Method
- Takakura Susun Method
- Open Windrow (improved version)

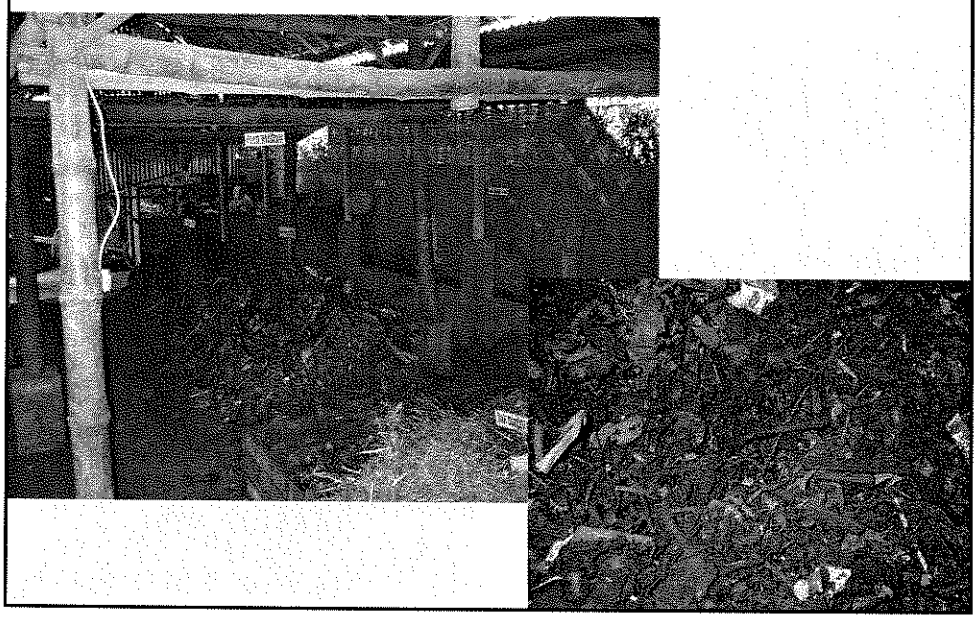
All know-how are included under this method.

Dramatic improvement in compost center

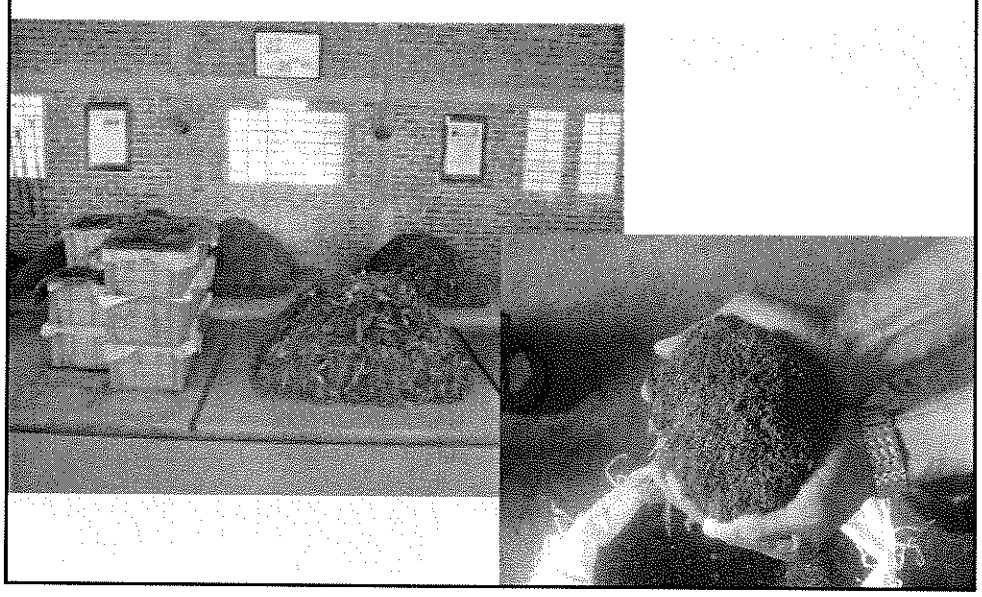
- Odor: Not generated
- Cockroaches, mice: Do not appear
- Flies, maggots: Sharp decrease
- Composting period: 3 mos→7-14 days
- Compost quality: High quality (high popularity and influx of orders)

Environmentally-friendly, sanitary operation

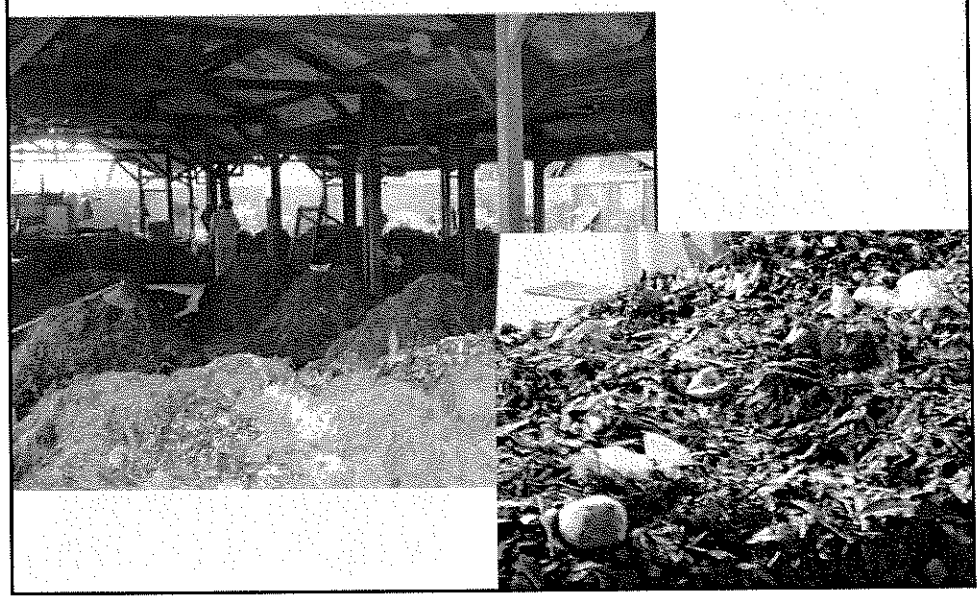
Composting activities (Past methods)



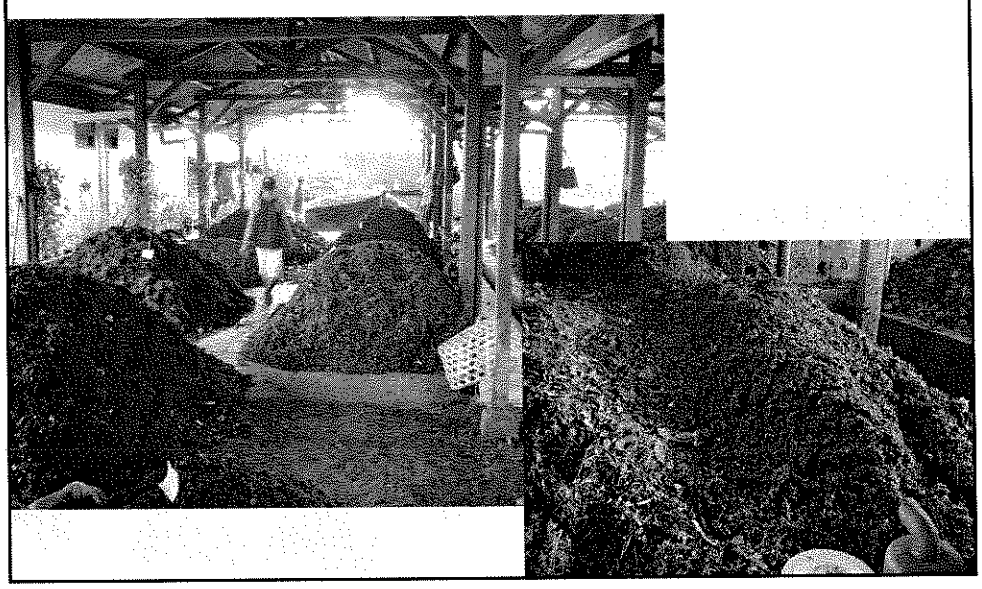
Composting activities (Improved)



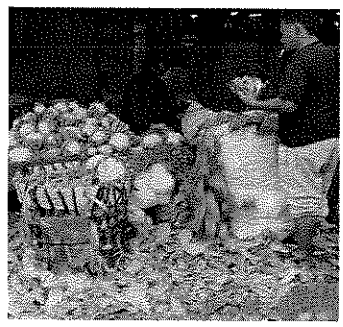
Composting activities (Past methods)

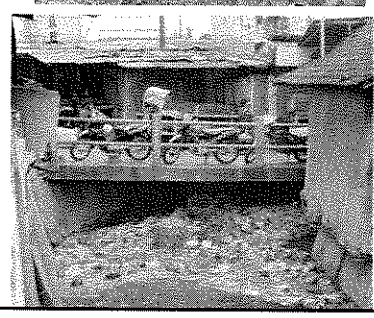


Composting activities (Improved)



MARKET (Past methods)



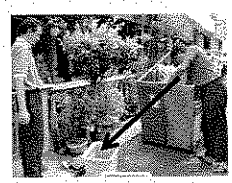



MARKET **(Improved)**

WASTE MANAGEMENT BASE IN COMMUNITIES
Takakura Home Method

Composting Process in each household

Pick up compost in community



Change with new native microorganism

Data Input (weight and the quality of the compost) Purchase

Transportation to the composting center

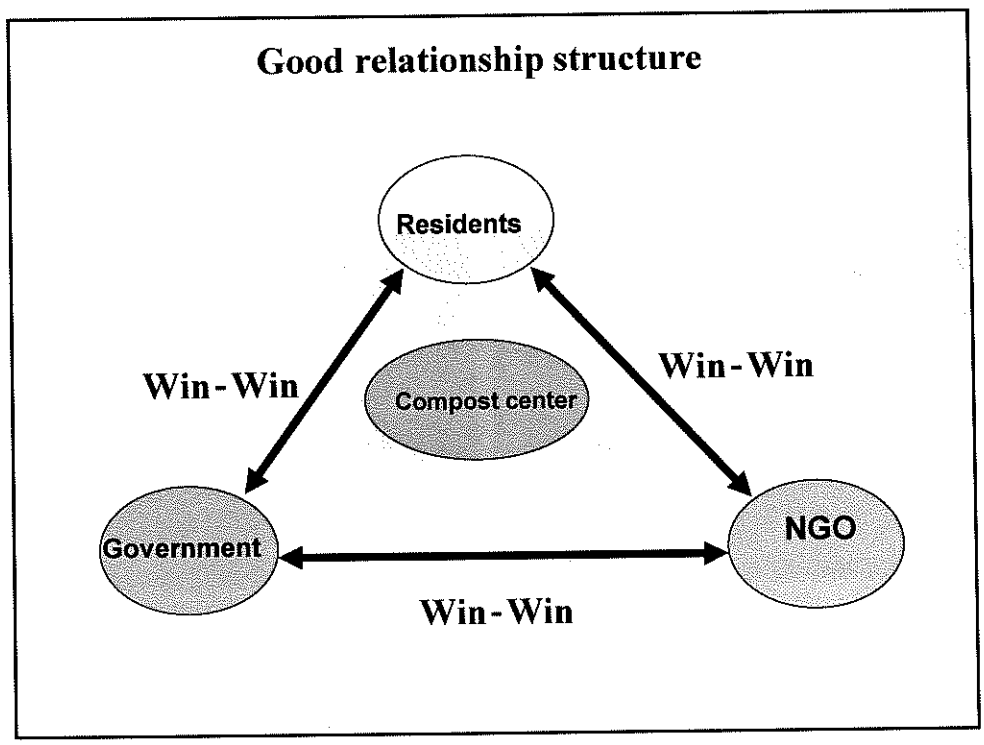
Composting Center

WASTE MANAGEMENT BASE IN COMMUNITIES
Direct collection of waste

Changes in the community

Achievements

- **Environmental Benefits**
  - Reduction of waste through composting of garbage
  - Improved public awareness of recycling, waste separation
  - Solution to odor problems from composting facilities, living environments
  - Improvement of environmental awareness through composting
- **Social Benefits**
  - Improvement of hygienic conditions in living environment
  - Network of local residents and people involved in environmental improvement
  - Networking with other cities (local governments, NGOs)
- **Economic Benefits**
  - Improvement of profitability through effective composting
  - Payment of interest to residents from compost purchases



Let's work together

Terima kasih

（3） Economic and Political Analysis of Composting

Kitakyushu Initiative for a Clean Environment:

Composting Workshop in Bacolod

"Economic and Political Analysis of Composting"

May 21, 2008

IGES Kitakyushu Office

Researcher: Toshizo Maeda

0. Introduction

- Institute for Global Environmental Strategies (IGES), Kitakyushu Office
- "Kitakyushu Initiative for a Clean Environment (KI)", since MCED 2000, UNESCAP Program
- An inter-city network program: over 60 cities in Asia-Pacific region
- Objective: Promotion of good practice
- Bago is one of active KI members

1. Types of composting systems

- Decentralized household organic waste composting (→ Takakura Home Method)
- Collective household organic waste composting (→ Takakura Susun Method + New windrow system)
- Market organic waste composting (→ New windrow system)

2. Business model of composting

(1) Household organic waste composting

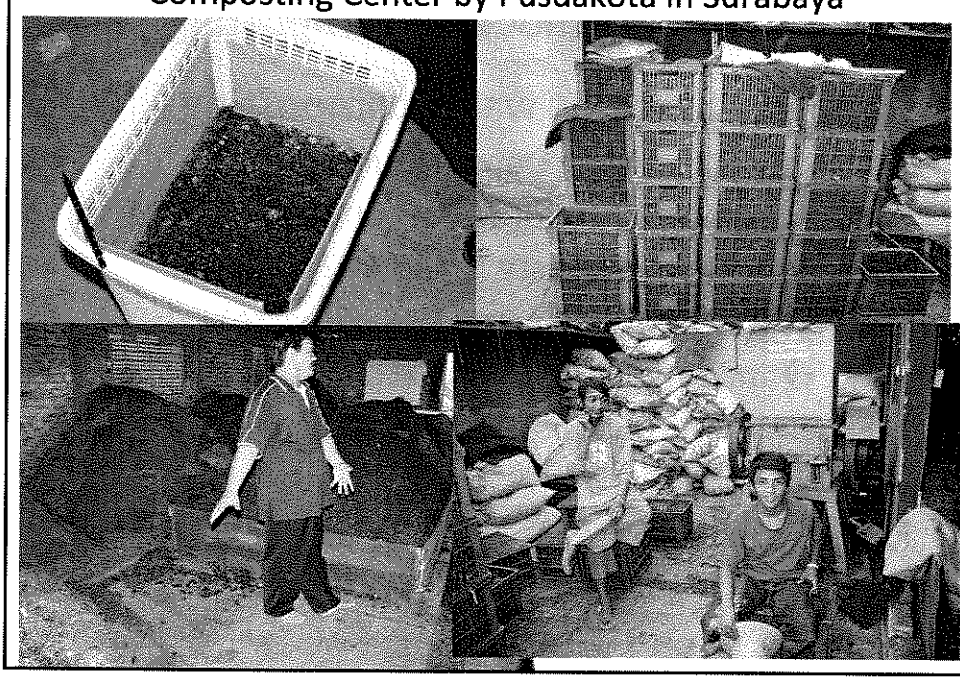
- A case by Pusdakota (NGO) in Surabaya
- Takakura basket (US$10 a unit)
- 500g/hh/d of waste → basket is full in 2~3mth
- Pusdakota buys the compost at US$0.07/kg
- Residents use the compost for flower & plants
- Waste does not rot → hygienic environment
  → Clean streets, community solidarity
- Env. & social incentives, not economical

2. Business model of composting

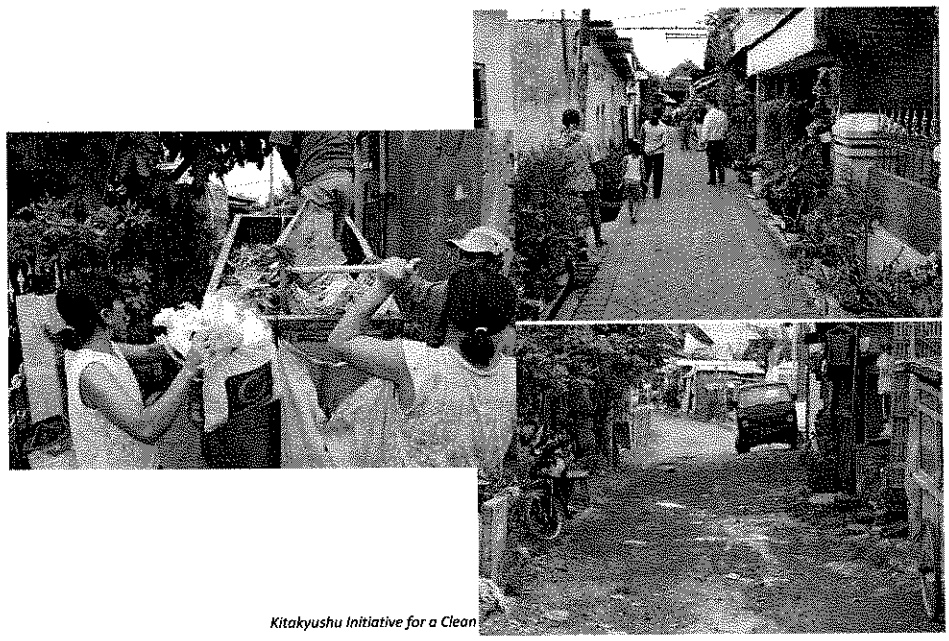
(2) Collective HH organic waste composting

- A case by Pusdakota (NGO) in Surabaya
- Collection of 1.4t/d of waste from 2,000 hhs
  - → 40t/m of waste (A=200m2)
  - → 6t/m of compost (15% of waste)
  - → Income: US$420/m (US$70/t)
- Expenditure: US$220/m (2 workers, utility fee & admin cost)
- Profit: US$200/m (= can purchase a shredder in 6 months)

Composting Center by Pusdakota in Surabaya



Household waste collection by Pusdakota in Surabaya



2. Business model of composting

(3) Market organic waste composting

- A case by Cleansing Dept. in Surabaya
- Collection of 5t/day of waste (one of 13 centers)
  - → 150t/m of waste (A=300m2)
  - → 22t/m of compost (15% of waste)
  - → Income: US$1,500/m (US$70/t)
- Expenditure: US$500/m (6 workers, utility fee & admin cost)
- Profit: US$1,000/m (= can buy a shredder in 1 month!)

2. Business model of composting

(4) Waste management cost

- Transportation: US$10/t (1hr-drive to dumpsite)
- Landfill management: US$10/t

  → Total: US$20/t
- Case-2: Household waste compost (40t/m) → cost saved: US$800/m
- Case-3: market waste compost (150t/m) → cost saved: US$3,000/m

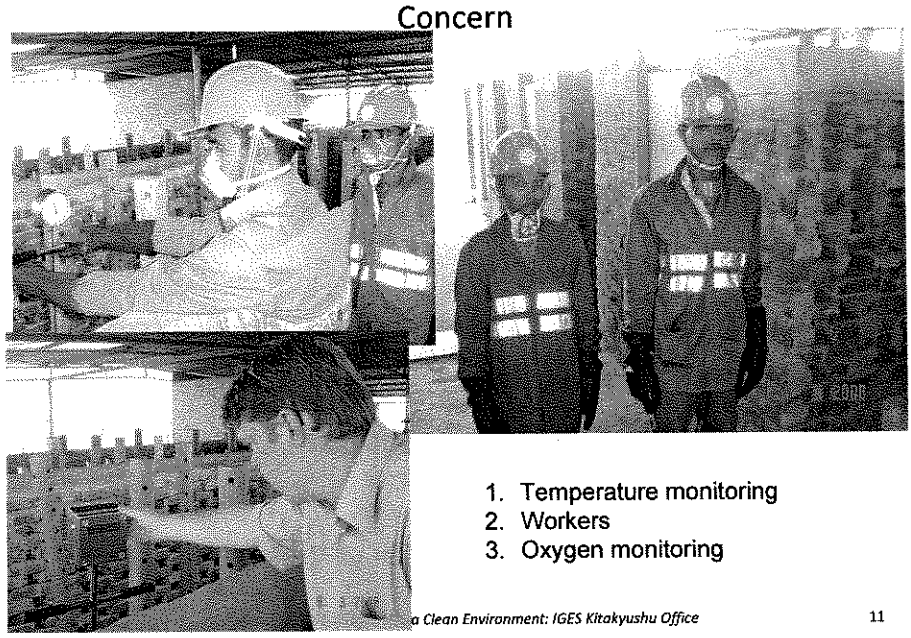
  ← Additional budget for a city!

2. Business model of composting

(5) Composting and CDM

- 3 composting projects were registered as CDM
- Waste Concern's (NGO) 100-700t/d composting plant in Dhaka will be operational in Aug 2008.
- Transport market waste by their own expense due to carbon credits.
- 3.8t/d-waste composting plants for 1,800 hhs (replicated in 26 cities in Bangladesh)
- *"If land is provided free..., fixed cost can be recovered in 2.5 years..." --- by Waste Concern*

10t/d-waste Composting Center in Dhaka by Waste Concern



1. Temperature monitoring
2. Workers
3. Oxygen monitoring

3. Achievements in Surabaya

- Waste reduced by 10% at Benowo Landfill (1,500t/day in 2005 → 1,300t/day in 2007, population: over 3 million)
- Establishment of 13 composting centers → all of market organic waste is composted (over 50t/d)! --- encourages source segregation
- Job creation: 6 workers x 13 centers = 78
- 20,000 units of Takakura Baskets distributed → Clean & green city, hygienic environment

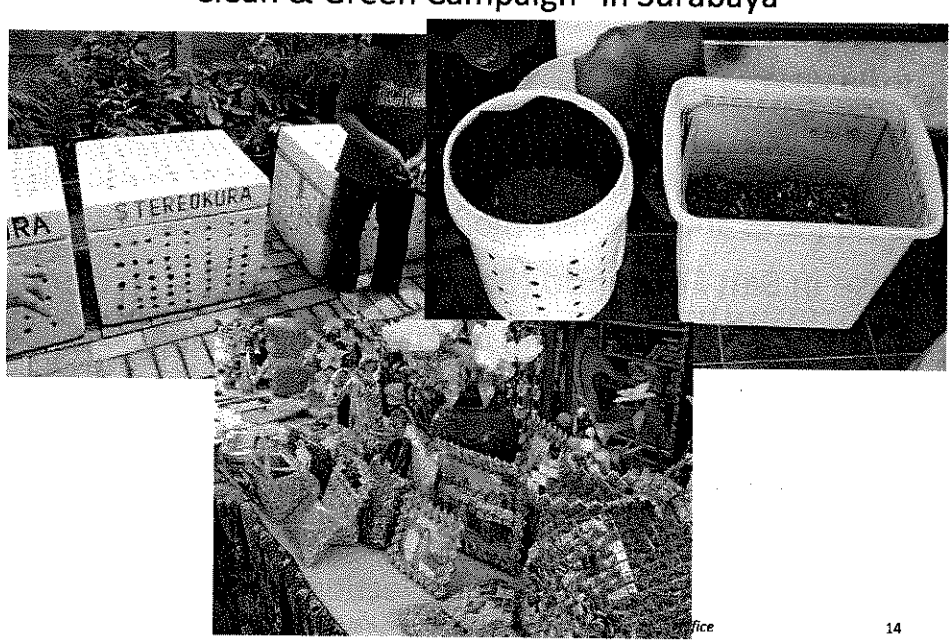
4. Supporting policies in Surabaya

- Local govt. (Cleansing Dept):
  → 13 composting centers; use of composts in parks
- Private sector (Unilever, Java Post):

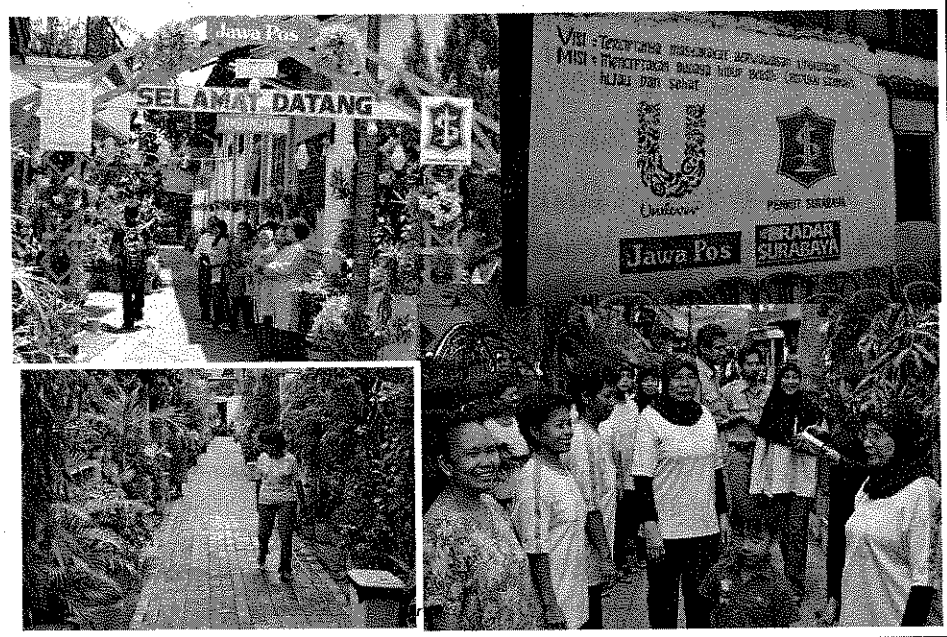
→ "Clean & Green Campaign" since 2002, competition among communities, awards, Cadre system (community environemntal leaders)

- NGO (PKK: housewife groups): → Basket delivery
- NGO (Pusdakota): → Composting training, tech disse.
- External assistance (KITA, Mr. Takakura):
  → Technical assistance, stakeholder coordination

"Clean & Green Campaign" in Surabaya



"Clean & Green Campaign" in Surabaya



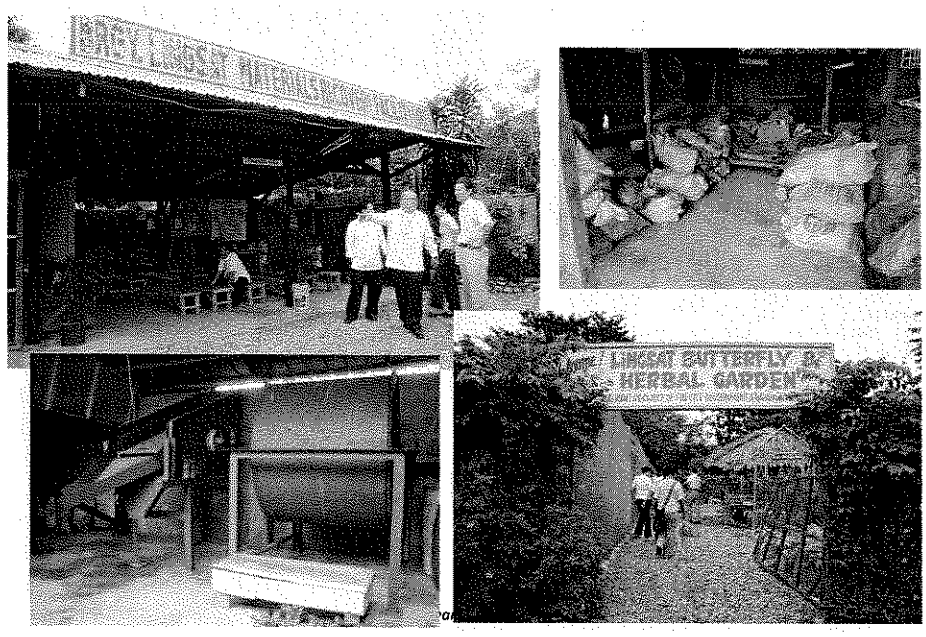
4. Supporting policies in Surabaya

- Pusdakota (NGO) sells composts to private firms (no subsidy)
- Surabaya City is not allowed to sell composts → use all for parks and greenery (poor soil, high demand)

Case in San Fernando (Barangay Lingsat):

- City buys composts from barangay (vermi composts, PHP100-120/sack)
- Barangay owns 2 trucks and transport waste to landfill (City subsidizes purchase of truck by 30%)
- Barangay charges 6,000hhs collection fee (4 barangays)
- Barangay employs 12 staff (collection and sorting)

Compost Center of Barangay Lingsat in San Fernando

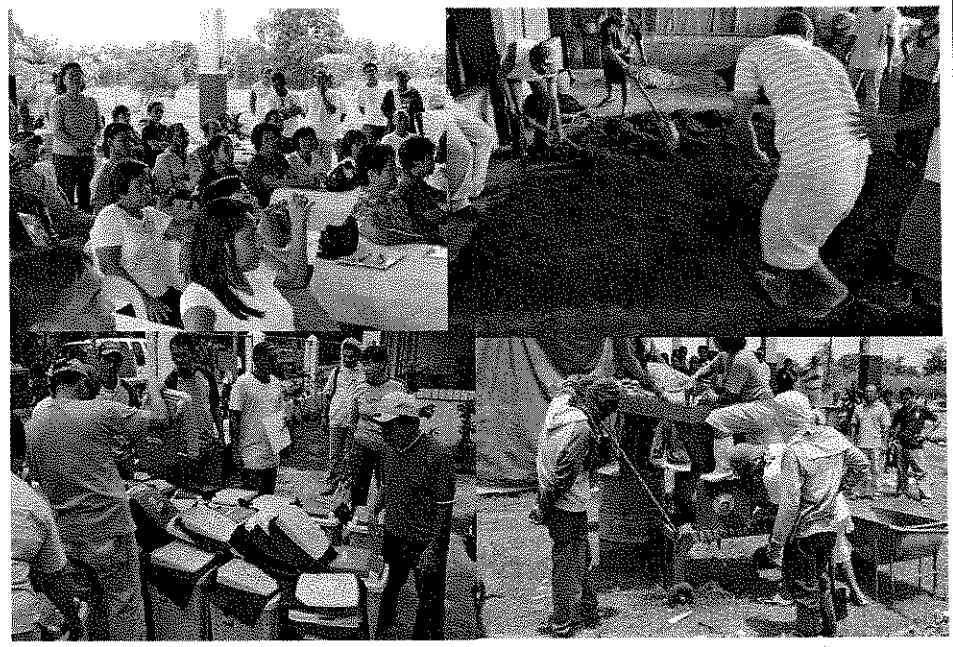


5. Implication to Philippines cities

(1) Case in Bago

- 1t/day collection of market organic waste
  → 30t/m of organic waste
  → 4.5t/m of compost (15% of waste)
  → Income: US$210/m (US$70/t) , mud-press compost is sold at PHP240/50kg-sac in Bago)
- Expenditure: no additional cost
- Profit: US$210/m (cost saved: US$600/m)
- Necessary space: 150m2 (Eco-Center)

Compost project in Bago



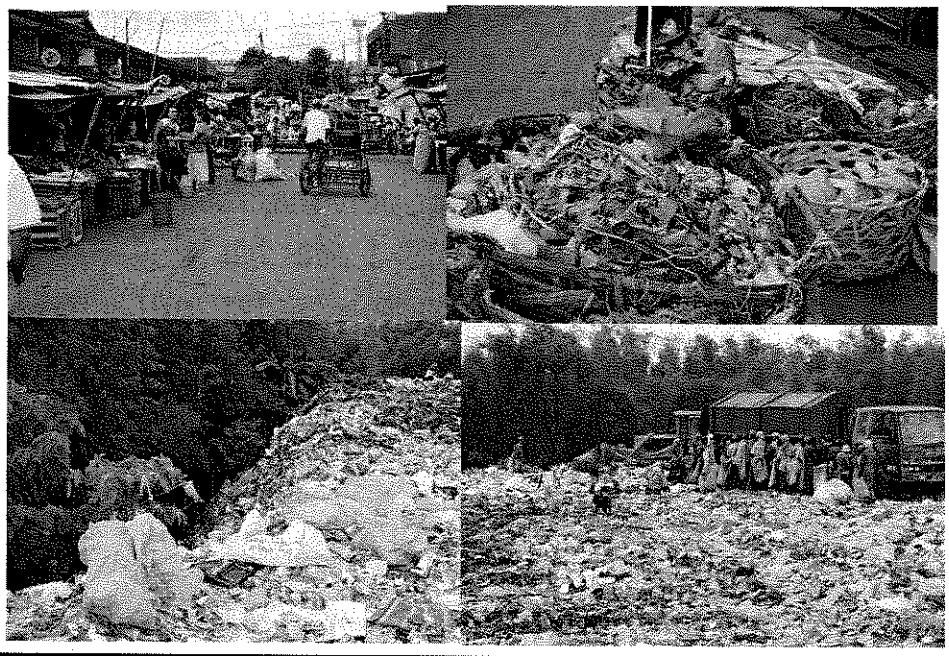
5. Implication to Philippines Cities

(2) Case in Bacolod

- 5t/day collection of market organic waste
  → 150t/m of waste → 22t/m of compost
  → Income: US$1,500/m (US$70/t)
- Expenditure: US$700/m (6 workers ++)
- Profit: US$800/m (cost saved: US$3,000/m)
- Necessary space: 300m2 (South Terminal)

"The imported inorganic fertilizer price doubled in one year's time from 700 pesos (17.5 U.S. dollars) one bag weighing 50 kg to 1,400 pesos (35 U.S. dollars), as chemical fertilizers are made with oil whose price is also soaring..." http://news.xinhuanet.com/english/2008-04/08/content_7930639.htm

Current situation in Bacolod



5. Implication to Philippines Cities

(3) Case in Cebu

- 20t/day collection of market organic waste
  → 600t/m of waste → 90t/m of compost
  → Income: US$6,300/m (US$70/t)
- Expenditure: US$3,000/m (24 workers ++)
- Profit: US$3,300/m (cost saved: US$12,000/m)
- Necessary space: 300m2 x 4
- Pagtambayayong Foundation (NGO) has expressed an interest to set-up a composting center

6. Takakura Composting Method

- Developed by Mr. Takakura in 2004 in corp. with Pusdakota (NGO), KITA (Kitakyushu International Techno-cooperative Association) and Surabaya City [it took 1 year for coordination and to develop the system]
- Spread in Surabaya in 3 years (20,000 baskets and 13 composting centers, 10% reduction of total waste)
- Spread to Semarang, Denpasar, Tarakan, Jakarta, Medan, Makassar,,,

6. Takakura Composting Method

1) Local material (fruits, vegetables, fermented foods, rice bran and rice husks)
2) Native microorganism (lactic acid bacteria)
3) Short period: 1-2 weeks
4) Less space: 200m2 for 1.5t/d, 300m2 for 5t/d
5) No offensive smell, no seepage (no disease)
6) Only shredder (no other mechanical inputs)
7) Job creation (labor intensive)
8) Good quality compost (active microorganism)

7. Bago APFED Project & KI Activity

- Budget: US$30,000
- Community-based SWM (waste bank, composting & environmental education)
- Period: Mar 2008 – Mar 2009 (1 year)
- Trainings: Apr & May 2008
- Final workshop (policy dialogue): Feb 2009

KI Researches in the Philippines

- Evaluation of Ecological SWM Act (RA9003)
- Improvement of final disposal sites (in 2008)

10% waste reduction is possible in 2 years.

Thank you!

Ⅴ. List of Participants

Republic of the Philippines
City of Cebu

Takakura Method of Composting Orientation-Training

Pagtambayayong Foundation Inc., P. del Rosario Ext., Sambag 1, Cebu City
May 17, 2008 9:00 AM - 5:00 PM

ATTENDANCE

Name	Office/Address
Lilia Calambro	City Hall, Cebu City
Florida R. Rosos	Balangkapuna, Sambag 1, Cebu City
Candelaria Ubas	San Juan
Judith Emero	San Juan
Nenita O. Bonjoc	Duljo-Fatima, Cebu City
Bernadette G. Gabrillo	Duljo-Fatima, Cebu City
Charmie B. Pepito	SP-Hon. Jagmoc
Anecita J. Mata	ASUPA
Misael D. Abrica	Isda Tayud, Basak Pardo, Cebu City
Teresita Figuracion	Inayawan, Cebu City / CESET
Ana Maria Cinco	Bo. Luz, Cebu City / CESET
Mirasol T. Bajenting	Dumlog, Talisay City
Maximiana Beltran	Puntod, Alaska Mambaling, Cebu City
Lydia Tenebro	San Juan
Rizalita Jabonillo	San Juan
Dionisio S. Gualiza	DPS
Randy A. Navarro	DPS
Gardenia R. Alaba	Brgy. Ermita, Cebu City / GAD Focal
Ralph H. Aresa	Brgy. Ermita, Cebu City
Genelyn Malael	Puntod
Alex Malael	
Marivic Axinto	AMCI ALU Pier-I
Ulgarico Jao, Jr.	Arellano Blvd., Cebu City / Pier I
Ma. Joan Patillas	Arellano Blvd., Cebu City / Pier I
Joan Demata	Arellano, Brgy. San Roque, Cebu City

Ma. Cerlita Loyloy	Tac-an, Talamban, Cebu City
Rosemarie Ann Torino	Balangkapuna, Sambag 1, Cebu City
Joey Baclayon	Cebu City Government
Lalyne Alcos	Balangkapuna
Hilda Torres	Balangkapuna
Luvizminda Gabato	Balangkapuna
Marelyn Sepillos	Balangkapuna
Noli Tenefrancia	CAD
Myrna Amandoron	Balangkapuna
Elizabeth Tima-an	Brgy. Luz, Cebu City / CESET
Rhodora Villacencio	Brgy. Luz, Cebu City / CESET
Mary Flor Rojos	Balangkapuna
Christie Ejara	Balangkapuna
Coasocacion P. Paña	Brgy. Luz, Cebu City / CESET
Teresita Besa	Balangkapuna
Dave Dacua	Brgy. Pasil, Cebu City
Hope S. M	PFI
Pastor Maque	
Nienes Lamban	Balangkapuna
Londong Fernandez	102 P. del Rosario Ext., Cebu City
Maria Theresa Gabato	Balangkapuna
Jaspher Obiña	PFI
Erma C. Ramos	PFI
Ric Teng	Busay, Cebu City
Nenita Fernadez	VMO-CMB
Josefina E. Archival	Sitio Plaza, Apas, Cebu City
Roger Sinconiegue	Sitio Plaza, Apas, Cebu City
Marilyn Sinconiegue	Sitio Plaza, Apas, Cebu City
Mildred Susan K. Siyang	Brgy. Punta Engaño, Lapu-lapu City
Antonia G. Danac	Punta Engaño, Lapu-lapu City
Conchita Cañaco	Punta Engaño, Lapu-lapu City
Amelia B. Kyamko	Brgy. Apas, Cebu City
Rosalina Fuentes	CESET
Vicente Paws	Apas, Cebu City
Samuel Maribojoc	Achival/CESET
Crispina Remilite	
Johnnie G. Gemiston	Brgy. Lorega, Homeowners Asso.

Victoria A. Gimang	SRP-HOA
Ma. Precilla Manayon	SRP-HOA
Giovanni Benjamin Alicaba	225 Gardenville II Subd., Busay, Cebu City
Eddie Planas	Cebu Daily News
M. Paracuelles	ABACA / Brgy. Apas, Cebu City
Rebecca Flordeliz	ABACA
Ramie K. Chavez	Brgy. Lorega San Miguel
Pablo Cabague	Brgy. Lorega San Miguel
Marcheta B. Oruz	Brgy. Apas, Cebu City
Ramil Ayuman	Brgy. Apas, Cebu City
Joni Flor Monteveros	CPDO, Cebu City
Loubert Tan	MMT-Cebu City
Hon. Nestor D. Archival	SP
Susan Romo	Urban Ville
Elina Menchavez	Urban Ville
Leonarda V. Pepito	San Roque
Rica Albores	CPDO, Cebu City
Misty Magistrado	MMT-CPDO, Cebu City
Portia A. Abugan	CPDO, Cebu City
Erwin Tapere	CPDO, Cebu City
Paul C. Villarete	CPDO, Cebu City
Ma. Dianne Rallon	CUSW / Hon. Archival's Office
Francisco L. Fernandez	City Administrator's Office, Cebu City

KI DEMO PROJECT NATIONAL TRAINING SOLID WASTE MANAGEMENT...
COMPOSTING AND WASTE MANAGEMENT SEGRAGATION
CHO CONFERENCE ROOM, MAY 19-20, 2008

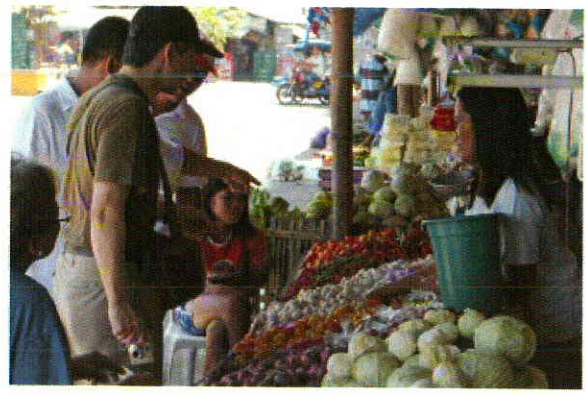
	NAME	DESIGNATION	ADDRESS	AGENCY
1	Josephine F. Palacios		.	Fed. Of Brgy. Women's Club
2	May Rochelle R. Ebora	SWMO Staff	San Carlos City	LGU
3	Raul P. De Arce	SWMO Staff / Collection incharge		
4	Dionisio S. Gualiza	Dept. Head	Cebu City	
5	Noli T. Tenefrancia		Cebu City	
6	Noel T. Alvarez	AT-II	Bago City	OCA
7	Thelma Watanabe			OISCA
8	Mary Joy Roquez			OISCA
9	Frank S. Navisaga	Prk. Pres.,	San Esteban PH II	
10	Remia F. Boncalon	Pres. Bago City Women's Club		Bago City Women's Club
11	Gail Delas Alas	SW		
12	Randy Agustin		Brgy. Busay Bago City	
13	Elvie Tesorio			Kalikasan Foundation
14	Fe Barcibal	Kagawad	Brgy. Lag-asan	
15	Eduardo Malones	AT-5	Bago City	OCA
16	Raymundo A. Lagayao	Brgy. Kagawad		
17	Peregrin H. Vasquez			C.E.O
18	Antonio Bailon			G.S.O
19	Franklin Patalita			ECO CENTER
20	R. Mendez			ECO CENTER
21	Sergio Piansay	Kagawad		
22	Celso H. Jacutan	Sweep Foreman		LGU-CSFLU
23	R. Perocho			ECO CENTER
24	Mila F. Boren			Kalikasan Foundation
25	Neil J. Ravillo		Brgy. Sagasa	
26	Jocelyn Go			G.S.O
27	Cleovel G. Villanueva	PIO II		
28	Emiliano T. Baylon		Bago City	City Agriculturist
29	Mitchelle H. Supera			G.S.O
30	Kristine Lou Balceda			G.S.O
31	Mario Montano			ECO
32	Liza B. Pireda			ECO
33	Riffy Mariposa			G.S.O
34	Retchle Madrenino			OISCA
35	Angelo Ambong			ECO
36	Ingrid Joanne M. Espelita		Clerk I	CMO-HRMO
37	Methusam Montias			CMO
38	Chitanell S. Luna			CMO
39	Kristine O. Gayoso	Clerk I	Bago City	HRMO
40	Ricky Medina			CEO
41	Vicente Mesias	Sems	Bago City	CMO
42	Rose Mary Soguilon		Bago City	HRMO
43	Ma.Stella F. Dumaran			HRMO
44	Joseph M. Hermogenes			City Health office
45	Luvisminda Gargar			City Health office
46	C. Rio			CMO-HRMO
47	Andrew Delfin			CMO- HRMO
48	Tricia Y. Matti			CMO
49	Ma.Julanie R. Benavente			CMO-HRMO
50	Benedict J. Kuey			CMO-HRMO

VI. **Photos**

Photos: Workshops in Bago, Cebu and Bacolod

Bago City, 22-26 April 2008

Buying fruits at a market in Bago for producing seed compost



Buying vegetables for seed compost

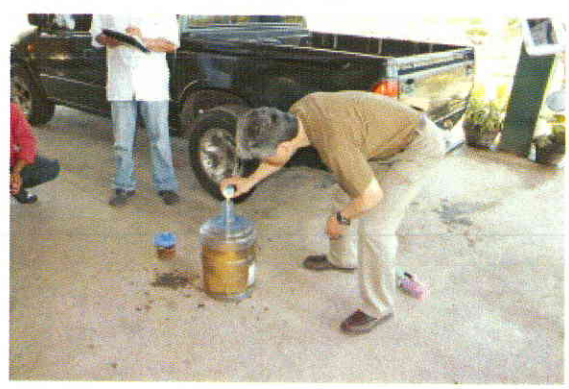
Buying salt for seed compost

Buying local soy sauce for seed compost

Initial training for Eco Centre staff

Peeling fruits and vegetable

Soaking fruits and vegetable peels to salted water in a small container for fermentation



Mixing local wine, yoghurt, local soy sauce and brown sugar with water

Photos: Workshops in Bago, Cebu and Bacolod

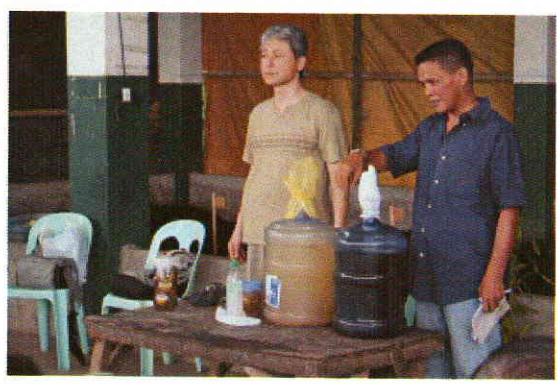
Mixing gently and leave it for three days for fermentation

Visiting a private company in Bago which produces compost from mud-press

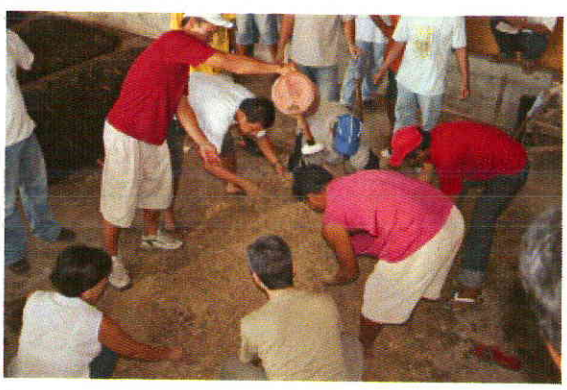
Mud-press, residual of processed sugar cane, is freely available in Bago. It has high heat content.

Lecture on basic concept of compost in the morning in Bago

Hands-on composting training at Eco Centre in the afternoon



Fermented microorganism in water tanks is displayed



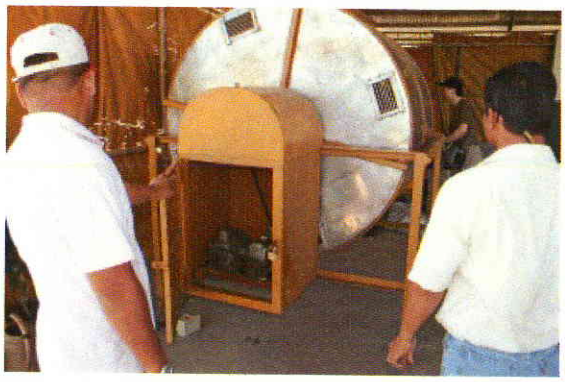
Mixing rice bran, rice husks, mud-press with fermented microorganism and water

Water content is checked by hands

Photos: Workshops in Bago, Cebu and Bacolod

Ongoing vermi composting at Eco Centre in Bago City

Active warms in vermi composting



Rotating machine for adjusting moisture and acidity of shredded organic waste

Good quality of final vermi compost product

Visiting a house where vermi composting is practiced

Compost is used to grow plants and vegetables

Compost sold in packs

Vegetables grown in compost

Bago City, 19-20 May 2008

A heap of seed compost became smaller after three weeks

Mixing shredded waste with seed compost

Mixing shredded waste with seed compost

Mixing by hands

Mixing rice husks, mud-press and rice bran to produce another heap of seed compost

Sprinkling fermented microorganism

Aeration holes were made on plastic containers which were distributed to each household for composting.

Card board box was fixed inside plastic containers to prevent compost to drop out from holes

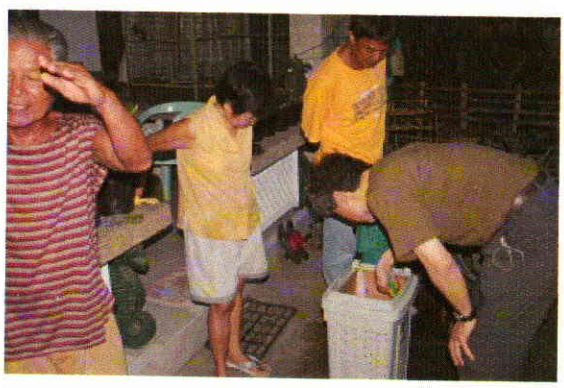
Photos: Workshops in Bago, Cebu and Bacolod

Black synthetic cloth was applied on top of the container to prevent flies to enter

Explaining how to use household compost box to residents

Questions from residents in Barangay Lag Asan on how to use the compost box

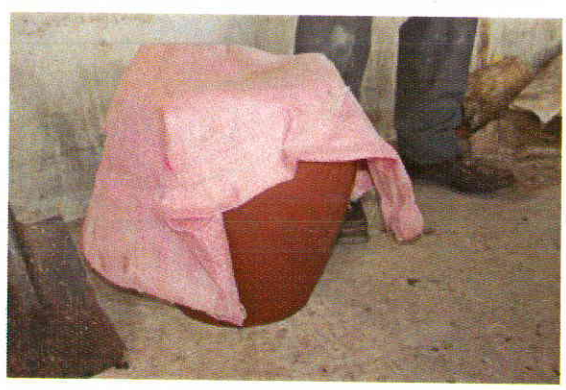
Distribution of household compost boxes



Inspecting the performance of a household compost box

Inside a household compost box. Most organic waste is decomposed in few days.

Looking for appropriate bamboo baskets in a market for household compost use



Clay pot was used for household waste compost as an experiment, which is working well

Photos: Workshops in Bago, Cebu and Bacolod

Participants of 2-day workshop in Bago

Banner on 2-day workshop in Bago

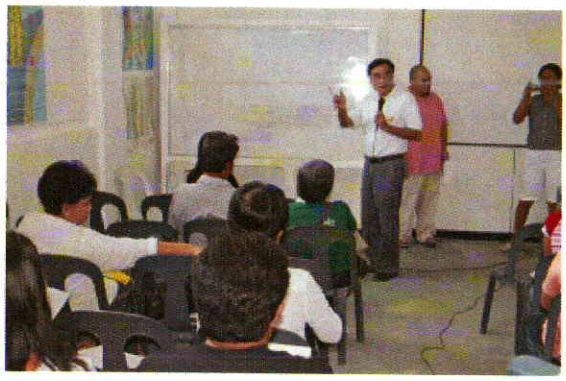
Lacto Papi, a local fermented drink made from soy beans, is also a good local microorganism

Demonstrating shredding of organic waste with seed compost

Mayor of Bago City, Mr. Ranib Torres, welcomes the participants

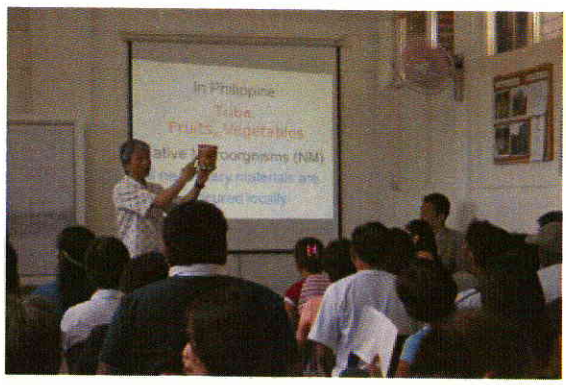
Participants of the 2-day workshop in Bago

Cebu City, 17 May 2008



Mr. Binbo Fernandez, Administrator of Cebu City, gives an opening speech

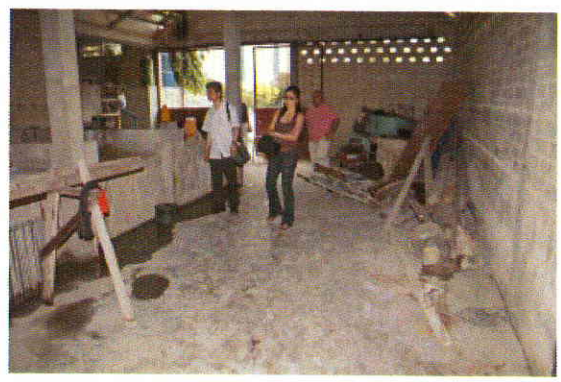
Mr. Paul Villarete, City Planning and Development Coordinator, explains the workshop objective



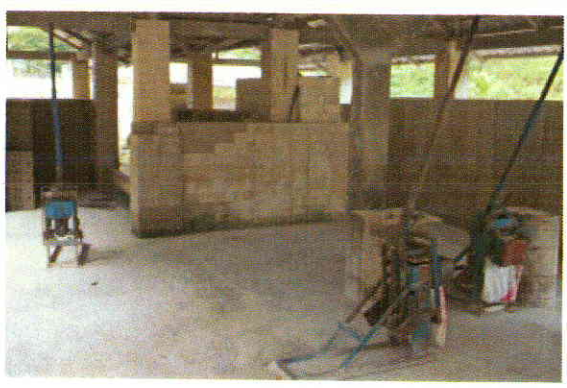
Mr. Koji Takakura explains the basic concept of compost

Participants smelling the fermented microorganism

Seed compost production was demonstrated inside the conference room



Inspecting a potential compost centre of Pagtambayayong Foundation



Bricks are produced by resettled residents for their income generation

The site is about 30-minute drive from the city centre

Bacolod City, 21 May 2008

Liberta Market in Bacolod

Vegetable waste piled up on the street is an ideal raw material for compost

Disposal site in Bacolod which locates next to Bago River. Many waste pickers.

Participants of 1-day workshop in Bacolod in the morning session.

Mr. Takakura and Mr. Joseph (translaotor). Mr. Gasataya, Councillor of Bacolod in the middle.

Participants of 1-day workshop in Bacolod at the South Terminal.

Demonstration of seed compost production with helps by Eco Centre staff in Bago

Mr. Max, Environmental Department, Bacolod City and other participants