What is an Organic Waste Composting Project?

In developing countries, organic waste accounts for more than a half of total household waste. The percentage even reaches 80-90% in some cities. On top of that, most of the waste from fruit and vegetable markets is organic. The organic waste composts project aims for effective use of such untapped resources through composting. In addition to compost production, the project brings various benefits such as reduction in waste generation by facilitating segregation of other dry waste and improvement in sanitary condition in households and communities.

Advantages of the Composting Project

- **Waste will decrease!**
  - Reduction in household organic waste
  - Improvement in household sanitary condition
  - Promotion of waste segregation

- **Soil will be rejuvenated!**
  - Boosting the growth of agricultural crops and plants
  - Softening the soil by adding microorganisms

- **Communities will become beautiful!**
  - Greener streets with the use of compost
  - Cleaner streets as a result of improved waste segregation
  - Gaining income by selling compost or plants grown with compost

Why is the compost method called “Takakura Method”?

The method was named after a composting expert, Mr. Takakura, who contributed in developing the method in Surabaya, Indonesia. It is widely called “Takakura Method” in Indonesia.

What is Takakura Composting Method?

**Features of Takakura Method**

- **Fast!!**
  Completes in a week or two.
  (Usually composting takes more than three months.)

- **Easy!!**
  Requirement is only mixing of the materials.
  Household composting with only a basket!

- **Cheap!!**
  Required mechanical input is only a shredder!
  It requires only locally-available materials.

In Takakura Composting Method, organic matter is composted by means of cultivation of microorganisms, which suit the soil and are commonly available in the natural environment, and of elimination of unwanted microorganisms. Above all, fermentative microorganisms play a central role in composting. Since fermentative microorganisms which perfectly suit composting inhabit our immediate surroundings, anyone can easily make effective compost by finding and culturing them. The effective use of fermentative microorganisms enables the production of a large amount of compost in a small space and in a short period of time. Moreover, the method is safe and economical as it requires readily available materials only.
Fermentative microorganism

Organic waste easily putrefies unless it is treated properly. One way to prevent this is by applying a large quantity of fermentative microorganisms and lead to a desired fermentation process. When the amount of fermentative microorganisms is larger than those putrefying, a transition to a good fermentation stage takes place. In contrast, organic matter putrefies and emits a foul odour when the amount of fermentative microorganisms is smaller than those putrefying. In other words, both sets of microorganisms fight for their own survival by competing with each other. In order to give advantage to fermentative both sets of microorganisms in this struggle for survival, plenty of them need to be prepared and applied from the initial stage of composting. No special fermentative microorganisms are required for composting except the ones that exist in our daily life, which are called Native Microorganisms (NM).

How to Obtain Fermentative Microorganisms

Good-quality fermentative microorganisms exist in the following substances (or places) and collection of them from various sources enhances the effectiveness.

1. **Fermented foods**
   Yogurt, fermented soybeans, unrefined soy sauce, local wine, mushrooms, yeast cells, etc.

2. **Leaf mold**
   The leaf mould collected in the wild is more effective than the commercially-available one. Also, leaf mould which is crumbling in contact with soil brings better results.

3. **Fields for organic farming**
   Be sure to obtain owners’ consent before taking any soil from them.

4. **Other natural materials**
   Rice bran, rice husks, straw, grass, rotten trees, etc.

Difference between Compost and Fertilisers

Crops require both compost and fertilisers. While fertilisers supply necessary nutrients for crops to grow quickly, compost gradually releases nutrients as it improves the soil environment. In other words, using compost every year improves the soil condition and thereby enhances its long-term nutrient supplying capacity.

Locations for organic waste composting

Organic waste composting can be practiced at each household and at a composting centre.

**Individual households**

Organic waste is composted at individual households, or waste generation sources. In this approach, organic waste is composted in a sanitary manner with little or no emergence of insect pests and foul odour as it is treated before putrefying. Also, all that is required is a small space and a little care. When 500 grams of organic waste is treated every day using a 60-litre composting container, it takes three to six months to be full.

**Composting centres**

Organic waste generated by households, fruit and vegetable markets, business establishments and others is collected and treated intensively at composting centres. There are mainly two methods for this approach: mechanised large-scale composting centres and manually-operated small-and medium-scale composting centres which also function as local waste disposal facilities. This booklet explains how to make compost at a small-and medium-scale composting centre in a week or two.
# How to make seed compost

Seed compost for organic waste composting can be made using common ingredients which contain a large amount of fermentative microorganisms. Fermenting solutions are mixed with rice bran and rice husks to allow microorganisms to grow.

( + ) + = Seed compost

## Making a fermenting solution

Different types of fermentative microorganisms can be collected by making both of the following solutions, which brings about better fermentation.

### Fermented foods + Sugared water

**Ingredients A**
- Brown sugar: Approx. 50g
- Tap water: Approx. 15 litres

**Ingredients B**
- Fermented foods
- Yogurt, unrefined soy sauce, local wine, fermented soybeans, yeast cells, etc.

- Mix together
- Cover the mouth of the container with a plastic bag and shake well.

### Fruits and vegetables + Salted water

**Ingredients A**
- Salt: Approx. 15g
- Tap water: Approx. 4 litres

**Ingredients B**
- Leaf vegetables, fruit and vegetable peels
- Grape, orange, apple, papaya, aubergine (eggplant), cucumber, Chinese cabbage, lettuce, pumpkin, etc.

- Mix together
- Shake well

---

### Point!

- The plastic bag/sheet used for sealing may swell out due to the generation of carbon dioxide gas, but it is not a sign of failure.
- The mixture has a sweet and sour smell/taste as well as the odor of alcohol when the process goes successfully. In contrast, the mixture smells strange and rotten when it fails. In that case, retry the procedure and use an increased amount of salt if it is made with salted water.

### How to make fermenting solutions

1. Put [Ingredients A] in the container and mix together.
2. Add [Ingredients B] to 1 and mix well.
3. Cover the mouth of the containers with plastic bags/sheets to protect against insects.
4. Leave the solutions for 3 to 5 days, for the fermentative microorganism to grow.
Mixing a fermenting solution with a fermenting bed

Make a fermenting bed

- Rice husks
  Approx. 1m³
- Rice bran
  Approx. 1m³
- Straws may be added
- Rice bran: Rice husks = 1:1

Seed compost for 40 to 50 households can be prepared using these ingredients.

Leaf mould
Put leaf mould in water
Loosen it well

Mix the fermenting solution with the fermenting bed

- Fermenting solution

Point
Adjust moisture level to 40-60% by adding the fermenting solution and water. (If the moisture content is right, the mixture becomes a lump without oozing of water when squeezed lightly with a hand.)

Example of failure
(Too much moisture)
Example of failure
(Too little moisture)
Example of success

Let the mixture ferment

- Cloth
- Thermometer
- Approx. 1m in height
  (0.6-1.5m)

Maintain the inside temperature at 60-80°C
※ If it is too hot to put your hand in, this means it is over 80°C and is too hot. Spread the pile to release heat.

When the entire surface becomes covered with white mould, it indicates the completion of fermentation. The fermentation will be finished in about 3 days. Then, let it dry afterward.
(The finished seed compost can be stored after it gets thoroughly dried out.)

Completion of seed compost

The basic material for composting organic waste is now ready for use.

Pile up the mixture in a trapezoidal shape, and cover the entire pile with a piece of breathable cloth. (Be careful not to allow harmful insects to enter.)
How to compost organic waste [For households]

A procedure for composting organic waste at source in individual households is described here. By following this procedure, organic waste can be composted in a sanitary manner without generating offensive odours and harmful insects as it is treated before rotting.

1. Making a compost container

Make a compost container in which organic waste can be smoothly fermented.

Prepare a container

Prepare a container of approx. 60 litres in capacity (with holes on every side) which allows air to pass though easily from all directions.

Place a cardboard box or a carpet on the inner side of the container

By placing a cardboard box or a carpet on the inner side of the container, the spilling of seed compost and the infestation of insects can be prevented. Cover the container with a cloth or a storage sack made of cloth or nonwoven fabric to prevent insects from entering.

Fill the container to 60% capacity with seed compost and cover it with a cloth

Using a plastic scoop (garden trowel) is recommended because it doesn’t rust and lasts long.

The whole container can also be stored in a nonwoven fabric sack.
Chop up organic waste, put it into the container and mix well.

- The more finely organic waste is chopped up, the more quickly it ferments.
- Drain excess liquid by squeezing.
- It is effective to loosen boiled rice with water beforehand, because it easily becomes lumpy.
- Keep the seed compost rather dry when the amount of vegetable scraps is large, because vegetables have high moisture content.

Maintain the moisture level at 40-60%.

Be careful not to let the moisture content become too high. Otherwise, the fermentation will be inhibited resulting in the generation of offensive odours.

If steam rises while the content is being stirred, it indicates the fermentation is in a good condition with the temperature reaching 40-50°C. (Excess moisture vaporises as the temperature rises.)

Set aside orange peels, onion skins and used tea leaves after drying as they can be used for the adjustment of moisture used content.

Cover the organic waste with seed compost

- Lastly, cover the organic waste with a layer of seed compost until it becomes completely invisible.
- Keep it warm by covering the container with a cloth or by closing the mouth of the nonwoven fabric sack.

Usually, organic waste decomposes and loses shape in 1-2 days.

Be sure to stir the entire content once a day.

This intensifies fermentation and inhibits the growth of undesirable microorganisms such as putrefying microorganisms.

Prevent insects from entering.
The whole container can also be stored in a storage sack made of nonwoven fabric.

Take the compost out of the container and check the moisture content. If it is too dry, adjust the rate by adding some water.

Put the compost in a breathable container such as a cardboard box or a sack for storage. Leave the compost for more than 2 weeks to reach full maturity before use.

Repeat the process every time you put in organic waste until the container becomes full. When the composting is going well, it takes 3-6 months for the container to become full with 500g of organic waste input every day.
How to compost organic waste
[For composting centres]

Organic waste collected from local households, markets and business establishments is composted at a composting centre.

1 Establishing a composting centre

Basic conditions for establishing a composting centre

★ Protection against rain and strong winds
★ No inflow of rain water and good drainage
★ Easy access to water supply
★ No direct sunlight
★ Lighting for nighttime work is available.
★ Not adjacent to houses; a certain distance is maintained.
★ Subsidiary materials such as rice bran and rice husks are readily available.

Either a concrete floor or an earth floor is fine. Choose whichever is suitable depending on working properties, fermentation methods and other factors.

Although no fluid seeps out of compost, it will be convenient for cleaning if the floor has drainage gradient.

Things to prepare

Shredder 
Shovel 
Rake 
Hand dredge 
Seed compost 
Organic waste

When composting the organic waste collected from many households...

It is necessary to control the activities of putrefying microorganisms by employing the following means, since the collected waste is already rotten in some cases:

1. Mix organic waste and seed compost in the proportion of 1:1, and put the mixture in baskets. Ensure proper ventilation.
2. Stack the baskets and leave them for about 3 days. (The temperature rises as they ferment.)
3. Shred the content.

The process 1 and 2 are not necessary if the collected organic waste is fresh.
Mix seed compost with organic waste, then shred the mixture

Shredding homogenises the mixture and intensifies fermentation.
**Organic waste:**
Seed compost (dry) = 1:1

Collect fresh organic waste from fruit and vegetable markets. Remove foreign substances when noticed.

Seed compost. Compost products from a composting centre can be used as seed compost after drying.

Organic waste has high moisture content (80-90%).
**Target moisture content is 40-60%.**

It is necessary to dry seed compost before mixing.

Pile up the mixture and stir it once a day

Pile up the mixture in a trapezoidal shape with a height of roughly 0.6-1.5m. Do not make the pile too high; otherwise the bottom part will become anaerobic due to compaction.

On the following day, the temperature of the central part increases and steam rises while stirring. High temperature accelerates fermentation and kills or inactivates undesirable microorganisms and weed seeds. Maintain the temperature at approximately over 60°C. If it exceeds 80°C, release the heat by spreading the pile.

Repeat the stirring for about 7 days

Repeat the once-a-day stirring for about 7 days and finish the fermentation process after confirming the following:
- The produced compost has an appropriate moisture content (40-60%) and maintains the temperature at approximately 30°C even after stirring.
- Organic waste has lost shape almost completely.
- It smells like soil.
- Extend fermentation period if fermentation is not yet completed.

Dry the finished compost and ship it

When fermentation is completed, dry the compost by spreading and ship it.
A part of dried compost is used as seed compost.
There is no need to make new seed compost every time since the dried compost can be substituted for it.
Fermentation performance is enhanced by replenishing new seed compost little by little continuously.
How to use compost

How to make effective use of the matured compost is described here.

When applying the compost by mixing with soil

Semi-matured compost sometimes damages the roots of crop plants during 2-3 weeks after being mixed with soil, because of the impact of gas and organic acid caused by the activity of fermentative microorganisms.

The produced compost is called semi-matured compost, in which organic matter has not been fully decomposed yet. Therefore, fermentative microorganisms remain active after the application of the compost. When applying compost by mixing with soil, be sure to let the mixture stand for more than 2-3 weeks before planting or seeding so that fermentative microorganisms will stabilise.

Spread the compost on the whole area of a field, and plough it to a depth of about 20cm.
※This method has the effect of improving topsoil as well as of softening the entire field.

When applying the compost to plants

Cover the soil with the compost after planting crops. (Mulching)
※The decomposition of the compost gets stimulated, which gradually brings about effect.

Cut a 10-cm deep circular furrow around a tree (ahead of its root tips) and put the compost into it.
Q&A about compost

Q1 Can any type of organic waste be composted?
A1 In principle, anything that people eat can be composted. Fish bones, which some people eat by deep frying, can be decomposed, whereas the bones of chicken, cow and pig are too hard to be decomposed. Egg shells are an appropriate ingredient for composting as they supply calcium.

Q2 Why is a basket used as a composting container? Can I use a cardboard box instead?
A2 A cardboard box alone can function well as a compost container. However it decomposes gradually because it is also organic matter. A basket will last longer. When a thin carpet is applied inside the cardboard box, it will last longer.

Q3 Can a container without holes, such as a dustbin, be used as a compost container?
A3 A compost container needs to have holes for ventilation since fermentative microorganisms which breathe (called aerobic microorganisms) are used for composting. Although if a cardboard box or a carpet is placed on the inner side of the container, both of them allow air to pass though easily.

Q4 Why is the once-a-day stirring necessary?
A4 Organic waste is decomposed by the action of fermentative microorganisms which require oxygen for their activity. Therefore, fermentative microorganisms (aerobic microorganism) need to be supplied with air (oxygen) by means of stirring so that they can always stay active.

Q5 The temperature does not rise and the organic waste does not decompose. Why is this?
A5 There are several possible causes.
● Since fermentative microorganisms breathe constantly, it is necessary to stir the content for aeration at least once a day regardless of whether organic waste is put in or not.
● If organic waste contains too much moisture, it does not ferment and the temperature does not rise. Drain organic waste thoroughly before adding.
● The pieces of organic waste may be too large! Chop it up finely, then the decomposition will be accelerated.

Q6 I am bothered by an offensive odour. Why is it generated?
A6 If the content lacks oxygen (or is in anaerobic condition), it starts rotting and generates the offensive odour. Stir it at least once a day to let the air in and keep the moisture content at 40-60%.

Q7 I am troubled by harmful insects such as fruit flies, soldier flies and maggots. How can I prevent this?
A7 If fruit flies and other insects deposit eggs on organic waste before it is put in the container, the content inevitably gets infested with them. Treat organic waste immediately after each meal without leaving it unattended.

Q8 The surface of the content is covered with tiny white insects. Why is this?
A8 The tiny white insects may be mites. The content sometimes gets infested with them when temperature does not rise and the decomposition process is slow. In many cases, the situation can be improved by stirring the content once a day to aerate it.

Q9 Can the produced compost be used right away?
A9 The compost product at a household is made from organic waste which was put in at different times ranging from several months earlier to the previous day. Therefore, it is necessary to let it reach maturity by storing it in a breathable container for more than 2 weeks before use.