

Basic Theory of Compost (Takakura Compost)

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Key Elements of Composting

- Fermentative microorganism
- Water content adjustment
- Aerobic fermentation (using oxygen)

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Various Microorganisms involved in composting

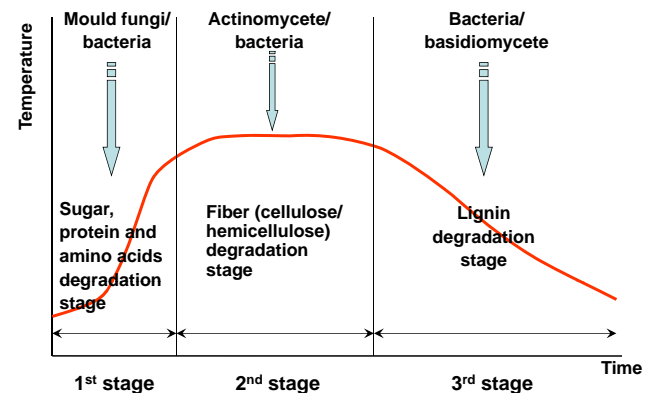
- One kind of microbe alone cannot complete composting.
- Priority type changes according to the stage of composting.
- Bacteria, mould fungi, actinomycetes and basidiomycetes are necessary.
- It is better to use as many types as possible within the same category of bacteria (fungi) to ensure diversity.



Don't expect that bacteria/fungi will proliferate on their own; rather, prepare them with purpose.

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Composting and transition of microorganisms (These processes proceed concurrently in a composting container)



Source: How to Make and Use Compost, FUJIWARA Shunrokuro, Rural Culture Association Japan

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1st Stage of Composting (Fermentation)

⊙ It is important to swiftly decompose easily decomposable organic matters using useful microorganisms.

Metabolic utilization of a wide variety of microorganisms is possible for easily decomposable organic matter.

For example, fungi and *E. coli* that cause food poisoning and allergies may proliferate through metabolic utilization depending on the condition.



Add fermented foods such as yeast and lactic acid bacteria to massively propagate safe mould fungi and bacteria.

→which also preserve the compost from decay



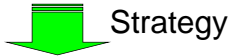
Gather many fermented foods of a wide variety



Second Stage of Composting (Fermentation)

◎ Most organic matters of vegetable origin are fibrous

cellulose, hemicellulose, lignin



Add actinomycetes (living in leaf soil) suitable for the breakdown of cellulose and hemicellulose.

You can make leaf soil yourself though it takes time.

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Collect at as many places as possible.

Third Stage of Composting (Fermentation)

◎ Lignin takes the longest time to break down in organic matters such as vegetable.



Add basidiomycetes (mushrooms) suitable for the breakdown of lignin.

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Gather a wide variety of mushrooms

Gather Fermentative Microorganisms in Local Area

- Microorganisms involved in fermentation of foods are effective.
- If fermented foods are not available, **half-broken-down leaves (leaf soil)** are effective.
 - Furthermore, you can gather bacteria and spores of mould fungi, actinomycetes and basidiomycetes at the same time.
- Microorganisms useful for composting are attached to the surfaces of fruits and vegetables.
 - Gather them using saltwater applying the method of *asazuke* (vegetables lightly preserved in salt). While salt suppresses the proliferation of germs that cause decay, gather your intended **lactic acid bacteria and yeast fungi**.

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Fresh

Vegetable skin

Leafy vegetable

Fruit skin



Effects Expected from Fermentative Microorganisms

Locally gathered microorganisms are not only effective for composting, but also:

- They **interact well** with the local soil.
- Microorganisms in fermented foods produce **hormonal-like substances** and **vitamins** that may facilitate plant growth.
- Certain kinds of actinomycetes produce **antibiotics**, which may create a disease-resistant soil environment.

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Cultivation of Fermentative microorganism-1 (sugar water)

Fermented foods + Sugar water

Ingredient A
★ Brown sugar: about 50 grams
★ Tap water: about 15 liters

Ingredient B
★ Fermented food
Yogurt, miso paste, moromi (unrefined sake), sake lees, natto, yeast, etc.

Container (about 20 liters)

Mix

Mix

Shake well after sealing the opening with a plastic bag.

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Cultivation of Fermentative microorganism-2 (saltwater)

Vegetable/fruits + Salt water

Ingredient A
★ Salt: about 15 grams
★ Tap water: about 4 liters

Ingredient B
★ Leafy vegetables, vegetable/fruit skins
Eggplant, cucumber, Chinese cabbage, lettuce, grape, papaya, pumpkin, etc.

Container (about 20 liters)

Mix

Mix

Shake well

POINT
Always use fruit skins to facilitate fermentation.

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Cultivation of Fermentative Microorganism-3

Fermentation liquid

If leaf soil is available
↓
Mix water and leaf soil
↓
Mix with base material

Base material (provides nutrition and medium)
Rice bran : rice husk = 1:1~5
Rice bran : rice husk : wood waste = 1:1:1
Rice bran : fallen leaves = 1 : 1~5

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Optimal Water Level for Composting

Appropriate water content is **40~60%**.

- Too little water slows the activities of fermentative microorganisms.
- Too much water reduces the amount of oxygen.
→ Creates an anaerobic condition leading to decay

↓
To reduce the risk of failure, maintain the moisture level of the fermentation bed in the compost container lower at 40-50%.

To speed up breakdown at a compost center, maintain the moisture level higher at 50-60%.

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How to adjust water content

POINT
Mix fermentation liquid and water and adjust the water content of the mixture in the range of 40 to 60% (If you take a handful of the mixture and squeeze it, it forms a ball but you do not actually have water running out between your fingers)

Failure (too much water)

Failure (too little water)

Success

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