

# bokashi method?

bokashi method  
of  
recycling food waste

[recyclefoodwaste.org](http://recyclefoodwaste.org)

bokashi gardening

bokashi farming

**bokashi composting**

bokashi bioremediation

bokashi

||

fermented organic matter

**fermented** ————— fermentation  
microorganisms

**organic matter** ————— organic  
soil parts

nutrients

# fermentation

*fermentation - where microbes break down complex molecules into simpler ones.*

Different kinds of fermentation  
(lactic-yeast; anaerobic digester/methane type)

We've been **fermenting foods** and **beverages**  
since ancient times to **feed ourselves.**

(kefir, dark chocolate, vanilla extract, kimchee, bread, mead)

Now we're **fermenting food waste**  
to **feed the soil and plants.**

# microorganisms

**microbes = microorganisms**  
**= microscopic organisms**

(archaea, bacteria, fungi, algae, protozoa,  
microscopic plants, microscopic animals)

**microbiome**

**Microbes are everywhere.**

Necessary for **all of life**, the **cycle of life**

**They terraformed our planet!**

pathogens

**disease causing**

by

**toxins or cell damage**

bacterial, fungal,  
viral, parasitic,  
prionic (protein)

only a **fraction of 1%** of all microbes

# organic matter & compost

## **organic matter**

once-living organisms:  
dead plants, dead organisms  
decaying or decayed (humus)  
*the forest floor*

## **compost**

decayed organic matter

## **composting**

the process of decaying organic matter

# Composting Types

by **biological process** (non-mechanical or low-tech: pile, bin, shovel, machine shovel)

temperature (in compost)	outside temperature	time	note	organisms	organisms' temperature
<b>psychrophilic composting</b> ( <i>cold composting or slow composting</i> )					
-18 – 13 °C (0 – 55 °F)	—	6 months - 2 years		psychrophiles also cryophiles	-15 – 10 °C (5 – 50 °F)
<b>mesophilic composting</b> ( <i>low temperature composting</i> )					
21 – 32 °C (70 – 90 °F)	minimum: 4 °C (39 °F)	6 months - 2 years	Usually the pre and post stages of thermophilic composting; Conditions for vermiculture (earthworms may appear or can be added)	mesophiles	25 – 40 °C (77 – 104 °F)
<b>thermophilic composting</b> ( <i>high temperature composting</i> )					
50 – 74 °C (122 – 166 °F) <i>Optimal:</i> 50–70 °C (122–158 °F)	minimum: 13 °C (55 °F)	12 weeks - 1 year (up to 6 months for average maturation period)	Preferable to keep below 66°C (150°F) to prevent beginning killing beneficial microorganisms and to prevent nutrient burn off.	thermophiles	45 – 80 °C (113 – 176 °F)
<b>hyperthermophilic composting</b> ( <i>very high temperature composting</i> )					
72 – 82 °C (162 – 180 °F)	—	If adding to active pile, first 6 hours results in liquid evaporation and cellulose destruction; maturation in a week(?) or longer	To compost meat and compostable plastics; high mass reduction rate (30+ to 1); do not let temperature go to 93°C (200°F), it's a fire hazard if not managed well, though rare.	hyperthermophiles	60 – 122 °C (140 – 252 °F) <i>Organisms' optimal range:</i> 80–105 °C (176–221°F)

# soil parts

**organic part** 1%~5%  
humus/organic matter

**inorganic part** ~45%  
rock/mineral particles:

clay	silt	sand
< 0.004 mm (< 0.00016 inch)	0.002 ~ 0.060 mm (0.00008 ~ 0.00236 inch)	> 0.060 mm (> 0.00236 inch)

**water** ~25%

**air** ~25%

organic matter in soil

**microbial life**

**nutrients**

**organic matter content**

purpose of bokashi

**microbial** inoculant

bioavailable **nutrients**

**organic matter** content

uses of bokashi

soil amendment

remediate soil

animal feed additive

**fermentation starter**

bokashi

**fermentation starter**

ferments organic waste:

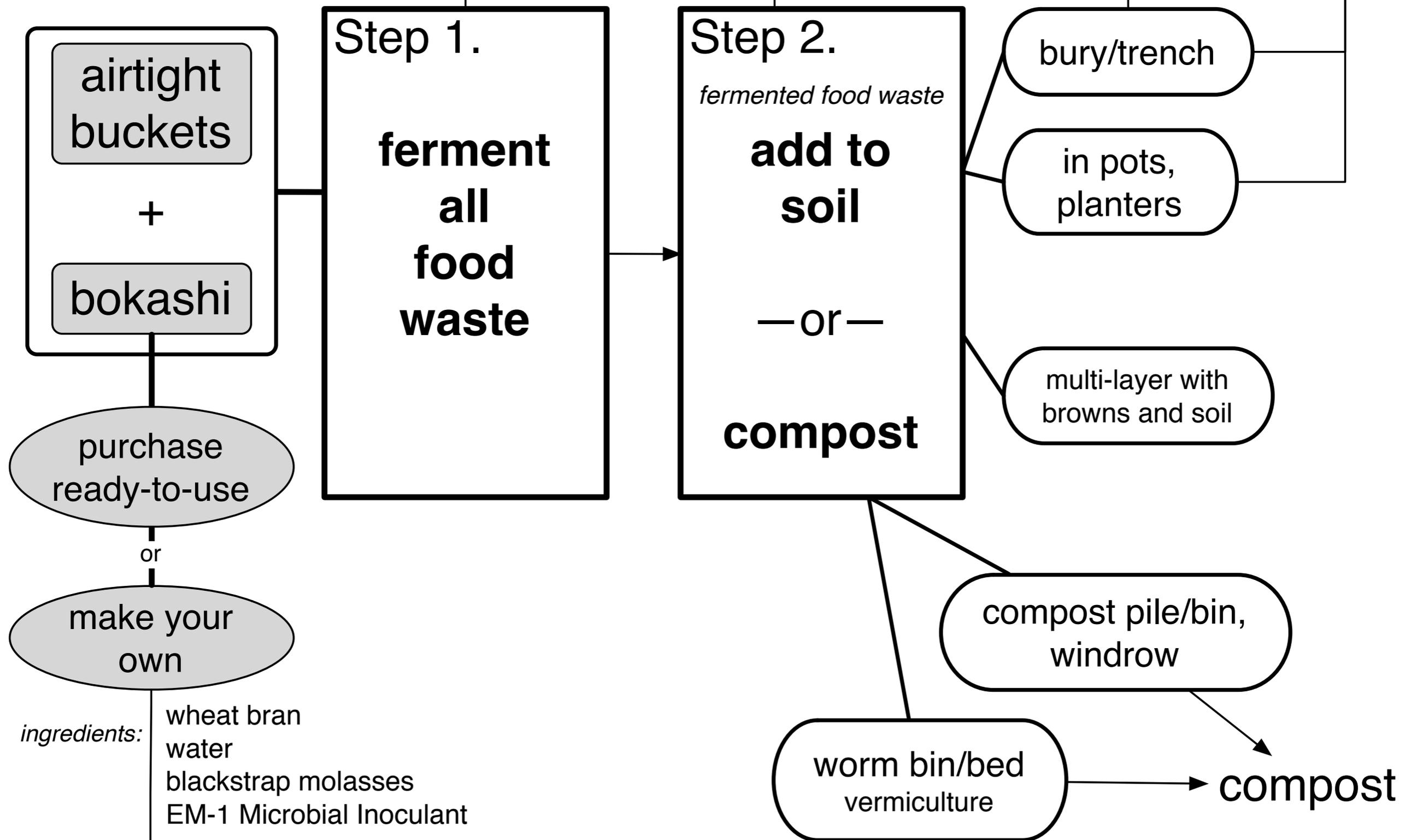
yard waste

animal/human waste

**food waste**

# The bokashi method of recycling food waste

2 weeks to ferment → 2 weeks in soil → then plant.



## Step 1. 'pickling'

fermenting food waste

**pretreats** (safer =>)

microbial pop. increase

release nutrients

organic acids (pH≈3.9)

amino acids (protein building block)

enzymes (breaks down materials)

coenzymes, bacteriocins (anti-pathogens)

antioxidants (naturally preserve)

2 weeks - room temp.

4 weeks - <50°F (enough mass)

all foods

lactic-yeast fermentation

## Step 2. 'break down'

adding to soil or compost

as a soil amendment

microbial inoculant

organic matter content

macro- & micronutrients

nutrients avail. & absorb.

2 weeks - warmer seasons

4 weeks - winter (successive)

90%~99% broken down

carbon negative

bokashi is made with

**wheat bran**

**water**

**blackstrap molasses**

**EM-1**

# Other bokashi materials

rice bran

coffee chaff

cocoa husk

coconut coir (shredded)

wood shavings

leaves

# Effective Microorganisms

EM, EM-1

Combination of 3 groups of microbes

**Lactic acid bacteria**

**Yeast**

**Phototrophic bacteria**

# bokashi

Originally (1940's? or mid 1600's?),

pristine soil, moss, etc.

ferment post-harvest residue, organic waste  
spread over the field

With EM (1982),

EM-1 + molasses + water + organic matter

Prof. Teruo Higa, et al

pristine forest and aquatic areas,

microbial density and diversity similar to EM.