

Lesson Sheet 5 — Making Bokashi

Terminology. bokashi, fermentation starter, starter, bokashi sprinkle, sprinkle, inoculant, microbial inoculant.

Definition. **bokashi**: fermented organic matter; **inoculant**: substance to introduce into a material, body, or region to treat, amend, or maintain Bokashi type⁽¹⁾: this is for making a simple type, using wheat bran as the dry matter*, as a fermentation starter and for other uses⁽²⁾.

Ingredients:	bran (1%)	example	non-bran (5%)
dry matter*:	wheat bran; or rice bran	12 lbs§	coffee chaff; or cocoa husk; or wood shavings†; or leaves
water:	1 cup of water/lb of bran	12 cups or 96 fl oz	2 cups of water/gallon of chaff; 1 cup of water/lb of cocoa husk
blackstrap molasses:	1% of the volume of water	0.96 fl oz => 1 fl oz	5% of the volume of water
EM-1**:	1% of the volume of water	0.96 fl oz => 1 fl oz	5% of the volume of water

* Dry matter — There are a wide variety of materials that can be used for making this type of simple bokashi. While certain materials (the non-bran) may not provide any added benefits by making them into bokashi, such as for adding certain nutrients to soil, they are instead useful as simply a microbial carrier and microbial inoculant. Before making them into bokashi, they need to be dry enough in order to prevent or minimize any other microbes from interfering with the fermentation process, and to allow greater absorption of the liquid mix (see Mixing below). The brans are dry, but non-brans are inconsistent.

Wheat bran can be purchased from animal feed/farm supply stores (e.g., Agway), which is much cheaper than food-grade wheat bran from grocery stores. Coffee chaff is a waste from coffee roasters; cocoa husk is a waste from chocolate factories (cocoa is fermented cacao beans roasted above 100°C, 212°F; raw dark chocolate uses the fermented cacao beans). While these waste materials may be free, they usually need 5% EM-1 and molasses, instead of 1%. § 12 lbs is the estimated average amount of bokashi a household of 1 or 2 persons would use for an entire year to treat their food waste.

** The EM-1 that we use in the U.S. is distributed by TeraGanix (teraganix.com) and made by EMRO USA in Tucson, Arizona; EM-1 is sold under 3 separate labels: EM-1 Microbial Inoculant (for soil/farm uses), EM-1 Waste Treatment (for liquid/solid waste, industrial, environmental, bioremediation applications), and EM-1 Septic Treatment (for septic systems: in RVs, boats, portable toilets, septic tanks); the separate labels are due to different state's regulation on use and state fees that applies. Otherwise, the contents are all the same; users should buy by the label according to use. EM-1 can be purchased online or in some stores—see <http://www.teraganix.com/EM-in-the-United-States-s/476.htm> for list of stores, or search for “EM-1 Microbial Inoculant”.

† Wood shavings, saw dust — certain woods can be fermented, including pine, teak, walnut, mahogany; other woods are difficult to ferment—avoid poplar and maple. Caution should be taken with some woods, such as walnut, and making them into bokashi should be done outdoors (during the mixing, some fumes may occur, but should subside). Using wood shavings, saw dust, including wood chips, as well as, leaves should be instead used as browns whether used in composting with fermented food waste (FFW), or used as mulch, or used if burying together with FFW. **Leaves** can be fermented into bokashi, but have to be relatively clean and completely dry to properly ferment, therefore, it's easier to use as browns or mulch than to prepare it for fermentation.

Calculations (equations).

By the amount of bokashi to make: $B \times R \times P = A$	By the amount of EM-1 on hand: $A \div R \div P = B$
B = amount of dry matter by weight [lb] or by volume [gal.]	A = amount of EM-1 (and blackstrap molasses) [in fl oz]
R = 8, amount of fl oz per cup [8 fl oz]	R = 8, amount of fl oz per cup [8 fl oz]
P = 0.01 (1% for bran); P = 0.05 (5% for non-bran)	P = 0.01 (1% for bran); P = 0.05 (5% for non-bran)
= A, amount of EM-1 (and blackstrap molasses) [in fl oz]	= B, amount of bokashi that can be made [lbs or gallon]

Tools: mixing tub(s) [e.g., 10-gallon capacity size all-purpose mixing tub]; pail or large bowl to mix the liquids; measuring cup; tablespoon; bucket with airtight lid; paper and tape to label the bucket.

Mixing: Mix the liquids together first before gradually adding the liquid mix to the dry material (wheat bran, in this case).

Step 1. Mix the liquid solutions [using example of 12 lbs of wheat bran]:

- 1.1. Add water (tap water is okay) [12 cups] into a bucket or bowl; optionally use warm water so that the molasses dissolves easily.
- 1.2. Add blackstrap molasses [1 fl oz, or 2 tablespoons] to the water and stir or rub by hand until all of the molasses has dissolved.
- 1.3. Add EM-1 [same amount as the molasses] to the water and stir lightly, briefly.

Step 2. The liquid mix is added (not all of it) to the wheat bran to make it about 30% moist, as follows:

- 2.1. Place the wheat bran [12 lbs] in a mixing tub, and add about half the liquid mix onto the wheat bran.
- 2.2. Stir by hand in a circular motion, as if rubbing (this prevents clumping); mix thoroughly so moisture is spread evenly throughout.
- 2.3. To determine ~30% moisture: grab a handful and squeeze; if liquid drips, then it's too wet; if it does not stick into a ball, then it needs more liquid; continue adding the liquid mix while stirring by hand until it sticks together, but does not drip; should feel just wet.

Step 3. Ferment the inoculated wheat bran for 2 weeks in an airtight bucket.

- 3.1. Put the entire mixture in a bucket; push down hard so as to pack it into the bucket (12 lbs should fit into a 5-gallon bucket).
- 3.2. Make sure lid closes tightly and cleanly (no debris on the rim of the bucket, nor in the groove of the lid).
- 3.3. Label the bucket (e.g., with index card and tape): “**Fermenting bokashi, date, Ready: 2 weeks after date**”

After 2 weeks, the bokashi is ready to use (if a white mold-like bacteria [*actinomyces*] appears, it is fine). It'll be moist and so as the bucket is opened and closed to use the bokashi, within 2-3 weeks it may mold green or yellow. Therefore, the bokashi should be air-dried: spread the bokashi on cardboard or newspaper about an inch thick; can dry some of it at a time if no space; can use the bokashi as it dries; takes about 2 to 3 days; then store in ziploc bags or containers—doesn't have to be airtight; avoid getting the bokashi wet; can last years.

- (1) Types of bokashi: anaerobic bokashi (bokashi, as here, made by fermentation); aerobic bokashi (made to culture aerobic microorganisms from the EM-1 microbes which include microbes that can live in anaerobic or aerobic conditions); nutrient-rich, nutrient-specific bokashi made for certain crops or orchards (example, bokashi made with the following 3 kinds of dry matter combined: rice bran, fish meal, and oil cake).
- (2) Other uses of this type of bokashi (wheat bran bokashi, or bran bokashi): as a fermentation starter to treat/ferment food waste; dog waste/animal waste; human waste (humanure/compost toilet—used instead of saw dust, or added to saw dust); yard waste; add to compost piles; add directly to soil as a soil amendment; to bioremediate soil; as an ingredient to make EM mudballs to bioremediate water; to add to cat litter box.