

# EM-5

*for soil, foliar spraying/feeding, and other uses*

EM-5 is used as a foliar spray and for inoculating the soil. It is a more potent version of Activated EM-1 and generally lasts much longer. It can be made at home using simple ingredients with EM-1 which consists of naturally occurring microbes (lactic acid bacteria, yeast, and phototrophic bacteria) that are usually not found together. EM-5 is used to directly apply to plants (avoid the flowers in certain cases), as well as, to condition the soil.

## How to Make EM-5

### Preparations

- **Implements** - bowl or bucket to mix in, measuring cup, PETE plastic bottle(s) or glass bottles with airlock, and (optional) funnel. Also, after making and letting the EM-5 ferment, you'll need either a spray bottle or sprayer or mister.
- **Water** - preferably warm water (optional)--heat enough to fill your bottle(s).

### Ingredients [example quantities for making 1 quart, 32 fl oz]

- **EM-1 Microbial Inoculant** (a liquid containing a combination of naturally existing microbes found in foods, soil, and water: lactic acid bacteria, yeast and phototrophic bacteria.)  
[5%, 1.6 fl oz or 5 tablespoons]
- **blackstrap molasses** (blackstrap, unsulfured sugarcane molasses; or high mineral content sugar material — if using some other sugar source, add a teaspoon of sea salt for mineral content.)  
[5%, 1.6 fl oz or 5 tablespoons]
- **distilled liquor** (40% alcohol, such as, vodka, tequila, whiskey, sake, etc.)  
[5%, 1.6 fl oz or 5 tablespoons]
- **vinegar** (for example, non-filtered apple cider vinegar; white vinegar is also fine)  
[5%, 1.6 fl oz or 5 tablespoons]
- **water** (optional: heated to 100-120°F to make it easier to dissolve the molasses; otherwise, simply dissolve with a clean hand)  
[to fill the remainder of the bottle—have at least 1 quart of water readied]

### Optional ingredients

- **garlic** 1 to 3 cloves (un-chopped cloves, but removed from the garlic bulb and skin) — good for fungal issues.
- **hot peppers** 1 to 5 (uncut whole peppers, one or more of the following different types: cayenne peppers, Thai pepper, tabasco pepper, serrano pepper, Scotch bonnet pepper, rocoto pepper, habanero chili pepper, Bhut Jokokia i.e., ghost pepper, etc.) — good for pest issues.
- **sea salt** [1 teaspoon] — adds minerals; helpful if also using EM-5 for cleaning and deodorizing.
- **liquid mineral extract** [a few drops to a dribble].
- **lemon** [1 whole lemon, juice squeezed and the peel sliced and also added] — for cleaning, antiviral and anti-pathogenic properties; adds lemon scent.
- Other plant, root or herbal materials you can also add (generally high in antioxidants and that are known for their property where the fermentation can then incorporate or enhance that property): ginger, orange peel, neem, etc.

How To Mix

1. Using a bowl or bucket that holds at least 1.5 quarts or more to mix the liquid materials; start by adding just 2 cups of water.
2. Mix in the molasses first. If using warm water, the molasses should dissolve on its own. Otherwise, make sure to dissolve all of it (if by hand, rub inside the bowl or bucket until the slimy feel of the molasses at the bottom is all gone).
3. Add the vinegar and liquor next, and add the EM-1 last (you'll add any optional ingredients in step 5 below).
4. Pour the mixture into your bottle (PETE bottle, such as, a soda bottle which can handle any gas pressure buildup, or glass bottle with a proper airlock--DO NOT use a glass bottle without a proper de-gassing mechanism; the glass bottle can explode if not degassed or burped). A funnel would be helpful to pour into the bottle.
5. Add any optional ingredients; example, 3 or more of the garlic cloves, 3 or more hot peppers, etc.
6. **Let ferment for about 2 weeks or longer at room temperature.**  
Keep away from direct sunlight.  
*Optionally, you can use a pH meter or pH paper; when the pH is below 4.0, preferably around pH of 3.5 (range of 3.2 to 3.7), it is ready.*

If using the PETE bottles, **daily check** for gas build-up; release by very slightly opening cap until the gas is released; do so over a sink or bowl in case of liquid overflow.

When ready, apply as suggested below, and use within 6 months (it may be good for as long as 1 or 2 years, but may not be as strong with viable microorganisms).

Keep at room temperature. Store out of sunlight.

Applications of EM-5

1. Dilute with water and apply at a rate of 1 part EM-5 to 1,000 parts water (**1 teaspoon of EM-5 to 1.3 gallon of water**) and spray directly to the leaves. While some flowers (the flower and petals, not the plant leaves and stem/stalk) may be affected by the EM-5 while others would have no problem, in either case, avoid applying directly to the flower petals or perform a test beforehand.
  - For a 32 fl oz hand-held **spray bottle**, fill with water and then add 2/10th of a teaspoon (or a dribble) of EM-5.
  - If applying **to soil**, use a **watering can** and at a heavier dilution rate of 1:500 (**2 teaspoons EM-5 to 1.3 gallon of water**).
2. Applications are most effective when applied in early morning. Application could also be done at night instead.
3. After the first application, apply on alternate weeks or once per month.
4. For best results, alternate with regular **Activated EM** applications.

EM-1 is OMRI Listed (Organic Materials Review Institute), omri.org, and can be used by certified organic operations.