

What are Effective Micro Organisms (EM's) and using the EM Activator.

Effective and Beneficial Micro-organisms (EM) are a mixed culture of fermentative, soil-based, beneficial micro-organisms which can be applied in many environments to break down organic matter and include:

- Gardening as a soil builder.
- Household Cleaning to exclude and eliminate harmful bacteria.
- Pets / Animals as a probiotic to reduce pet odours and for good health.
- Water purification to reduce algae and harmful bacteria in water.

When applied in the garden, EM increases the microbial diversity of soil, thus, enhancing growth, yield, quality, and disease-resistance. EM cultures do not contain any genetically modified micro-organisms and is made of mixed cultures of microbial species that occur naturally in environments worldwide but which have decreased in many soils due to over-use, chemical fertilizer and pesticide use. The principal micro-organisms in EM are:

A. Photosynthetic Bacteria. The photosynthetic or phototropic bacteria are a group of independent, self supporting microbes. These synthesize useful substances from the secretions of roots, organic matter and/or harmful gases (e.g. hydrogen sulphide), by using sunlight and the heat of soil as sources of energy. Useful substances developed by these microbes include amino acids, nucleic acids, bioactive substances and sugars, all of which promote plant growth and development. The metabolites developed by these micro-organisms are then absorbed directly into plants and act as substrates for increasing beneficial populations.

B. Lactic acid bacteria. Lactic acid bacteria produce lactic acid from sugars and other carbohydrates, developed by photosynthetic bacteria and yeast. Therefore, some foods and drinks such as yoghurt and pickles have been made with lactic acid bacteria for decades. However, lactic acid is a strong sterilizing compound, and suppresses harmful micro-organisms and enhances decomposition of organic matter. Moreover, lactic acid bacterium promotes the decomposition of material such as lignin and cellulose and ferments these materials, thereby removing undesirable effects of undecomposed organic matter.

C. Yeast. Yeasts synthesize anti-microbial and other useful substances required for plant growth from amino acids and sugars secreted by photosynthetic bacteria, organic matter and plant roots. The bioactive substances such as hormones and enzymes produced by yeasts promote active cell and root division. These secretions are also useful substrates for effective microbes such as lactic acid bacteria and actinomycetes.

Activating EM (AE-M - Activated EM) with the Garden Yoghurt Maker

The primary reason to activate EM is economy, not efficacy. It is perfectly acceptable to use EM without activating it. However, adding a sugar source (molasses) and culturing the micro-organisms ensures that the microbes are active. Having followed the instructions (see below) with your EM Activator, the end result will be a full strength culture of EM that can then be diluted and applied.

The EM culture & molasses supplied with the Activator will enable you to produce 5 litres of AEM. Replacement bottles of both EM and A+ are available.

Preparation of EM-Active

Effective Micro-organisms (EM) should be activated before using in the home or garden by adding water and A+.

DOSAGE:

Use the following calculation to make 1 Litre of EM Active.

- 50 ml EM
 - 50 ml Molasses
 - 950 ml Water
- = 1 litre EM-Active

METHOD:

- Take a 1-litre measure
- Half-fill the measure with lukewarm water
- Dissolve 50 ml of A+ in the measure, stirring well.
- Stir in 50 ml of EM solution.
- Top up to 1 litre with lukewarm water

Place the solution in the EM ACTIVATOR holder

- Close the lid of the inner container and put a little warm water in the space between the inner container and the outer unit.
- Close the outside lid of EM ACTIVATOR
- Switch on the activator
- The red lamp will show that the liquid will be fermented at the correct temperature
- Allow the solution to activate for 7 days and then transfer to a plastic bottle with cap.
- EM Active is diluted accordingly before use. Dilution percentages are specified in this brochure according to specific use.

Practical tips on EM

- A good fermentation process leads to white yeast flakes on the surface of the EM-Active. These flakes are harmless and do not affect the product or its use.
- EM-Active has a shelf life of 4 weeks. The sweet and sour smell is a good indicator that it is viable. If the EM has a rotten smell then it is no longer suitable for use.
- EM preparations are best kept in plastic bottles or containers. Do not keep in glass or metal containers (because of the formation of gas)
- It is important to use good quality water to make EM preparations. Rain water, spring water or filtered water is better than mains water that usually contains

chlorine. The affectivity of EM is reduced by the presence of chlorine and other chemicals.

- The bacteriological activity is reduced at temperatures lower than 6 °C. The microorganisms are not dead, just lying dormant and are reactivated again when the temperature increases.
- Spraying, atomising or scattering of EM preparations should be done with a diluted solution of 1:100. This is best carried out in the morning or evening or during wet weather.

The AE-M can then be used for a variety of uses:

1. In The Home

- Cleaning with EM. EM is a very acidic solution that re-populates surfaces with beneficial microbes. The presence of these microbes discourages mould, fungus and harmful bacteria from taking root.
- EM helps to eliminate odours from pets, cigarette smoke, and odour-causing bacteria, as well.
- A small squirt bottle filled with straight EM is handy to keep by the kitchen sink.
- It can be used to add to water for washing vegetables, to pour down the sink to reduce odours, and to spray on sponges to keep it fresh and reduce harmful bacteria.
- One teaspoon of EM can be added per load as the washing machine fills with water. This is recommended for light coloured laundry since the microbes love fabric dyes, and dark coloured articles have a tendency to fade.) If using EM, reduce detergent to 1/3 the usual amount. If possible, let the clothes pre-soak for 10-15 minutes before running through the cycle.
- Use 1 Tbsp of EM to about 5 litres of room temperature water for mopping ceramic tile or vinyl floors. No detergent is needed. For use on wood floors and furniture, dilute 3/4 tsp. to one 5litres water. Wipe dry immediately.
- Add 1 tsp. EM to a litre of water, and spray or wipe on tile, porcelain, and Formica. Let is stand on wood or plastic cutting boards to discourage salmonella and other harmful bacteria. Then rinse. This dilution must be used within 3 days.
- Diluted EM can be sprayed lightly in shoes to keep them smelling fresh and on shower curtains to discourage mould!!
- Clean dustbins & 'wheelie bins' with this mixture to reduce odours.
- Use a diluted solution and spray generously on light coloured automobile interior, door panels, light-coloured upholstery, and carpets to freshen and deodorize.

2. Gardening and Soil Improvement

- Gardening and Soil Improvement EM can be used to inoculate plants, water and soil in various ways to achieve beneficial results.
- It can be sprayed on soil as a pre-planting treatment, used to inoculate seeds or transplants, and applied to growing crops as a foliar spray or through irrigation systems.
- EM is useful in growing nursery crops, container-grown plants, and even in hydroponics.
- After crops are harvested, EM is used to help break down crop residues.
- EM can be applied to cover crops and green manures during growth and upon incorporation into the soil, and is applied to pastures with good results.
- General Directions:

- For most crop applications, EM or AEM is diluted with water at a ratio of 1 part EM to 1,000 parts water. Do not apply with pesticides or fungicides. It is best to start on a small scale and experiment with EM to determine the best methods and ratios for specific locations.
- Pre-Planting: Between two and three weeks before planting, apply a 1:1000 dilution of EM to the soil.
- Apply as a spray, drench or introduce into irrigation water.
- Seed Treatment: Gardeners may want to try soaking seeds in a solution of EM before planting to increase seed viability. Dilute EM with water at 1:1000. Soak seeds in solution for 5-10 minutes and no longer. Air dry and plant as usual. Experiment with small batches before treating larger quantities. Weak seeds and soil conditions may lead to decreased results.
- Nursery / Container-grown Plants: Inoculate with EM at seeding and transplant stages, then on a monthly basis thereafter. Use the standard dilution of 1:1000.
- Orchid growers have achieved good results by inoculating with EM immediately after planting in sterile media.
- Hydroponics: In hydroponic crop production systems, EM can be diluted with the nutrient solution at a rate of 1:10,000. This practice will coat the root systems with beneficial micro-organisms and make nutrient uptake more efficient.
- Vegetables, Fruits & Herbs: Spray the standard dilution of 1:1000 onto the plants.
- If introducing EM into an irrigation system, the dilution should be increased to 1:10,000.
- Apply as a pre-planting treatment, again at planting/transplanting and every three to four weeks during crop growth.
- Apply also to crop residues after harvest, just before incorporating residues into the soil. Use 1 gallon of activated EM per acre, diluted with the appropriate amount of water for each application.

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