

# Effective Microorganism Technology in fruit crops

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## ABSTRACT

The fundamental issue with organic or natural farming is the low yields obtained in comparison to traditional chemical farming systems. The original idea of employing Effective microorganisms (EM) in crop production, mainly in organic systems is to overcome intrinsic issue of low productivity. EM is a collection of beneficial regenerative microorganisms that occur naturally and are not altered in any way. This mixture improves the natural resistance of soil, plants, water, humans, and animals. EM enhances soil quality and fertility, as well as crop growth and quality.

## INTRODUCTION

Effective Microorganisms are microbial cultures that include photosynthetic bacteria, lactic acid bacteria, and yeasts. Which are

able to coexist with both aerobic and anaerobic microbes. These are applied to soil or plants to promote microbial variety in order to improve soil health as well as plant development, yield, and quality. The use of a liquid culture of Effective Microorganisms is referred to as EM Technology. EM is a liquid made from of naturally occurring helpful microbes. Many countries now produce EM, which uses strains of the suitable microbes that live naturally in the location.

## Concept of effective microorganism Technology

Effective Microorganism (EM) is not a collection of microbes; rather, it is a mixture of precisely selected microorganisms capable of delivering many advantages. We have many useful bacteria in our surroundings, but we don't know the activities of those beneficial creatures, therefore one may identify many different types of microorganisms found in our natural ecosystems. The EM's are naturally occurring, not genetically engineered, environmentally friendly, exhibits coexistence and co-prosperity. Microorganisms are classified into three types:

1. Microorganisms that decompose or degenerate
2. Microorganisms that are opportunistic or neutral
3. Microorganisms that are constructive/regenerative

## Benefits of EM applications

Improve soil structure (Soil aggregation, water holding capability, increase alkalinity). It helps in improving photosynthesis ability of plants. Enhances seed germination, growth, maturity, flowering, fruiting and ripening. It hastens decomposition (fermentation) of organic matter. Removes odour of animal dungs or organic matter used in organic fertilizer. Control or suppress pests and soil-borne diseases. Reduce re-

planting problem. The possibilities for using EM are numerable. The Effective Microorganism (EM) technology as an integral component in developing agriculture. The use of EM would help reduce costs and increase productivity in the Producing sector the above EM derivatives can help farmers or planters.

### EM effects on soils and crops

EM has been employed on a wide variety of soils and crops under a variety of situations. The data reveal that EM produces beneficial results in the vast majority of situations. EM is not a replacement for other management practices. EM technology adds a new dimension to our finest soil and crop management practices, such as crop rotations, compost utilization, crop residue recycling, and biological pest control. When utilized properly, EM improves soil fertility and promotes crop growth, flowering, fruit development, and ripening. It can boost crop yields and quality while also hastening the breakdown of organic materials from agricultural leftovers.

### Nutrient requirement stages of plant

**Before planting** - The soil should be mixed with organic fertilizers and compost

**Seeds** - Good seeds should be selected and germinated properly

**Vegetative stage** - The correct fertilizers applied for growth

**Change over stage** - The correct fertilizers applied for flowering

**Mature/Fruit Stage** - The correct fertilizers applied for maturing/fruiting

Applying the correct organic nutrients plus effective microbes (EM) at the right stage of growth, will help the plants to grow naturally and produce good quality crops or fruits.

### Necessary products to be made to use EM Technology:

For using EM technology effectively, it is necessary to prepare a couple of pre-products

based on EM. These are:

1. Extended or “Secondary EM”
2. Compost
3. EM “Bokashi”
4. EM
5. EM Fermented Plant Extract (FPE)
6. EM Rice water.

### Application of EM Technology

#### Using EM to make an Insect Repellent

This mixture will result in a non-toxic, chemical-free insect repellent. It can be used to keep pests and diseases at bay in the garden. It works by forming a barrier around the plant, protecting it from insects. Garlic, chilli peppers, or aloe vera can be added to the mix to make it more flavorful. These are chopped or mashed before being added to the mix.

#### Ingredients:

Warm water (chlorine free )	:	300 ml
Molasses	:	50 ml
Natural vinegar	:	50 ml
Whiskey or ethyl alcohol	:	50 ml
EM liquid concentrate	:	50 ml

Choose a good container for mixing, some plastic bottles with closures for storing, and a funnel. Stir the molasses into the warm water until fully combined. Then add the vinegar, whisky, and EM concentrate. Fill the plastic bottles halfway with the mixture and add tiny amounts of chopped garlic, etc. Seal as firmly as possible and store in a warm, dark place. Release any gas produced at least twice daily by removing the cap.

#### Using EM Liquid Concentrate

##### As a foliage treatment

Apply once a week with a clean sprayer, spraying directly onto the plants to ensure thorough watering. For optimal results and to

avoid leaf scorch, do this in the early morning or late afternoon.

### As a soil application

Water thoroughly; making sure the soil is completely covered by the solution. Apply as necessary on open ground or around mature plants. Apply EM dilution to the organic materials before putting it into the soil as compost or organic matter.

### As a compost application

Apply to the compost pile to lessen bothersome odors and flies while also enhancing the composting process and quality. To avoid over wetting the compost pile, it is preferable to sprinkle on with a hand sprayer and, if practical, apply after each addition of new material.

### EM in the soil

Microorganism populations can be found in most organic materials, including compost and animal manures. Many of them are advantageous when first introduced to the soil, but the already present soil microorganisms quickly outnumber them. As a result, the positive impacts of microorganisms supplied by the use of composts are frequently transient. When applied to the soil environment, EM cultures suffer from the same fate. However, the benefit of EM is that when introduced, beneficial microbes are considerably more numerous and in populations that are optimally balanced, so they remain dominant in the soil for a much longer period of time.

### Application of EM product Fruit Crops:

Maple EM 1-Hariyali increases fruit setting and quality Maple EM. 1-hariyali increases the population of beneficial microbes in the rhizosphere, thus increasing availability of nutrients. It increases shelf life of fruits and vegetables. Proactive spraying of Maple EM reduces incidence of pests and diseases. Introduction of Maple EM is very simple and cost effective for the farmers. At many places in Maharashtra like Pune, Ahmednagar gives significant result of

application of EM Technology. At BAIF, Pune, EM propagation is being handled directly by Dr. Joshua Daniel, who is an Agronomist and has done a lot of work in sustainable agricultural technology; there are many farmers who are today using EM for carrying out organic farming.

1. Foliar spray of EM has resulted in better 'taste' of onion, okra, green peas and carrot at the central research station (CRS), Pune. However, they have still not quantitatively estimated the parameters responsible for the improved taste.
2. Foliar spray has also given higher yields in green peas at CRS and tomato at Ahmednagar. An observation here was that there was an increase in the number of harvests by 2-3 in the EM sprayed plots.

### Banana cultivation with EM Technology

Given the importance to banana industry in Pakistan, Asim Agriculture Farm has taken serious view and decided to adopt effective microbes along with organic manures and various other cultural practices that are instrumental in increasing the productivity of banana crop in our climatic conditions. Banana is heavy surface feeder crop, as feeding roots lie in the upper 6 layer of soil, hence it requires heavy manuring. The application of irrigation water through ferment or resulted an increased leaf area index followed by thick green color and huge number of earth worms and other biological entities developed inside the soil which are serving as the natural tilth of the soil, the roots of banana plant taken up nutrients and water easily with increased biological activities.

- Application of effective microbes along with organic manures increases the productivity of banana crop.
- Banana fruit produced increased number of hands, size of finger and colour of fruit only after application of effective microbes.

## Citrus

Application of EM4 on Citrus gave significantly higher number of root, length of root, fresh weight and dry weight of root of the transplanted plant. The treatment of EM4 and rice straw, gave significantly higher plant, number of shoot and number of leaves.

Application EM stock solution at the rate of 5 lit/plant to citrus indicates significant increase in macro and micro nutrient in citrus leaves. Effectiveness of EM for controlling Asian citrus psyllid, *Diaphorina citri* Kuwayama was conducted at Entomology and Zoology Division, Department of Agriculture during August to December 1994. The EM was tested for its insecticidal and repellent properties on the 2<sup>nd</sup> and 3<sup>rd</sup> nymphal stages. The experiment consisted of 4 treatments:

- a. Spraying with mixed solution of molasses, ethyl alcohol, acetic acid, Em and Water (ratio 1:1:1:1:10) at 15 days fermentation.
- b. Spraying with the mixed solution as same as above but without EM
- c. Spraying with water only and
- d. Untreated.

The result showed that after spraying 3 days, psyllid nymphs in all treatments were not be killed and they also develop into the next growing stage. Moreover, EM had on property on repellent to the Asian citrus psyllid. It was concluded that EM was not effective in controlling Asian citrus psyllid.

## Other parts Of India:

EM Technology was introduced in Coorg district, State of Karnataka from December 2000. It has been used for the following projects:

1. Promotion of the growth of crops, which include Coffee, Tea, Cardamom, Vanilla, Black Pepper, Fruits like Pineapple, Strawberry and also Paddy.

2. The effect of EM on the growth of the nursery plants of coffee, cardamom and strawberries looks extremely encouraging, and efficacy will be ascertained during the next 4 months when the plants will be taken from the nurseries for planting in the field.

## Conclusion

Environment is bound with many microbes however with the passage of time and important developments; we have neglected our basic requirement and little unseen microbes which are important for us. EM is the one of the solutions used as alternative way in organic farming to overcome problems of the low productivity and decreased soil fertility etc. by production of amino acids, enzymes and other beneficial hormones. Further research needs to be carried out to know the benefits of other useful microorganisms.