

Emerald Earth

Nature Does It Best

Authorized EM® Retailer

EM•1® Applications for Ponds, Pools, and Aquariums

EM® stands for Effective Microorganisms™, an all-natural blend of beneficial microorganisms. EM•1® Microbial Inoculant is made through a natural process of fermentation. Nothing has been genetically altered or chemically engineered. EM•1® is safe and easy to use and is listed as a fully organic product by OMRI. EM Technology® is now being used in over 120 countries, and is resolving a broad variety of environmental problems.

The primary ingredients of EM•1® are comprised of three main genera: phototropic bacteria, lactic acid bacteria, and yeast. These naturally-occurring ingredients work synergistically together to secrete beneficial substances such as vitamins, hormones, enzymes, organic acids, bioactive minerals, and various antioxidants when in contact with organic matter.

The key ingredient in EM•1® that distinguishes it from other microbial blends is the phototropic strain of bacteria called *rhodospseudomonas palustris*—an ancient group of beneficial microbes known to break down and digest toxic substances. This unique ingredient has been shown to produce a broad variety of antioxidant byproducts including: *inositol, ubiquinone, saponin, low-molecular polysaccharides, polyphenols, and chelates of minerals*. These antioxidant alliances act to promote natural defense systems that suppress the growth of detrimental bacteria. The other ingredients applied in the production of EM® are primarily used to enhance the fermentation process.

Effective Microorganisms™ was discovered by the horticultural biologist Dr. Teruo Higa. It was first marketed in Japan in 1982 for organic agriculture. EM•1® Microbial Inoculant is now being produced in 54 countries and is being used for a broad variety of environmental applications.

Water Gardens and Ponds

Healthy water gardens and small ponds offer a valued aesthetic attraction to the home or business. These pools, however, develop their own ecosystems that can easily go out of balance. If the water is left stagnant for too long, mosquitoes will start to inhabit the area, algae begins to form in the water, and odors can start to appear. Adding in a feature that circulates the water can cut down on these problems. Depending on the water quality, however, algae and calcium deposits may still form.

Using EM•1® Microbial Inoculant on a regular basis will help to keep enough beneficial microbes in the system to keep nutrient levels low enough to prevent the growth of algae. EM•1® also has the ability to neutralize salts—which can act as a natural chlorinator—and prevent them from crystallizing on pool surfaces.

The monthly application ratio is 1:10,000, which is 1 part Activated EM® (AEM) for every 10,000 parts of water. (See our website, www.emearth.com, on how to produce Activated EM®.) It is recommended that this dosage be applied in weekly increments, rather than all at once. The water temperature should be 5°F above freezing. EM® Bokashi Packets are also recommended. Allow several weeks for the materials to do their work. Some sludge from the bottom will likely surface creating an unsightly scum. Leave it and let nature do its bioremediation – as it will disappear shortly.

If you have a larger pond or lake in your area that is in very poor condition and you would like to treat it with AEM, please feel free to contact Emerald Earth for assistance. These programs are often done for lakes that have a surface area of several acres that are fed by outside sources (besides rainwater), or have been contaminated by chemicals. For a water garden or small pond, the above application rates will work satisfactorily.



Water Garden with Circulating Flowforms

Hot Tub and Swimming Pool Applications

Many of us would gladly use hot tubs and swimming pools more frequently, if it weren't for the harsh chemicals that can be so irritating to the skin and eyes. Conventional treatments attempt to use antibacterial approaches for creating a sterile environment in the water. This antiseptic approach of destroying all bacterial life in the water often makes a bad situation worse. Healthy and beneficial microflora are what sustain biodiversity in our environments and help to build natural defense systems. Using Activated EM® (AEM) to naturally remediate the water helps to keep nutrient levels low enough to prevent the growth of algae, and acts to keep the water microstructured – which is soothing to the skin.



Adding EM to the water is soothing to the skin.

For hot tubs and pools, it is recommended to use AEM in combination with natural salts—which acts as a natural chlorinator. Salt consists of two elements: sodium (Na) and chlorine (Cl). An electrical impulse in *salt dosing devices* splits the elements into sodium hydroxide and natural chlorine, which helps to keep the pool clean without the harsh chemical negative side-effects.

There are a variety of factors which contribute to maintaining clean and healthy water quality systems—such as climate, evaporation, temperature, and frequency of use. Under normal circumstances, the ratio for swimming pools is 1 part AEM to 10,000 parts water. For a swimming pool that is 20,000 gallons in size, the application rate would be 2 gallons of AEM. For hot tubs, the application ratio is 1:2500. So for the average size hot tub of 500 gallons, the application rate would be 3 cups of AEM. Application rates depend on frequency of use. If the swimming pool or hot tub is used on a daily basis, then the AEM should be applied every week. If they are used moderately, then apply AEM every two weeks. If used infrequently, then apply once every month.

Aquariums and Fish Ponds

Water quality management is crucial for keeping aquariums healthy and clean. In that fish droppings and residual foods also pollute the water, it is important to mix the AEM in the water at a ratio of 1:1000 every month to help remediate the water. This would be $\frac{3}{4}$ of a teaspoon per gallon of water or 1 ounce for a ten gallon fish tank. It is recommended that this dosage be applied in weekly increments, rather than all at once.



EM Ceramics all work well mixed into the aquarium bedding.

When changing the water, it may be best to change approximately half of the water on a regular basis. If your tap water is chlorinated, let it set overnight in a large container in order to allow the chlorine to offgas – and be sure to include the K-Type Ceramics, which promote the micro-structuring of the water. Before adding the replacement water, be sure to include the AEM at the 1:1000 ratio.

Additionally, N-Type Ceramics (one bag for every 10 gallons) are effective in adsorbing nitrogen, which produces algae growth. S-Type Pipes, K-Type Pipes, and the Yugo Ceramic Balls all work well for aquarium bedding applications.

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