

EM•1® — Effective Microorganisms®

Concentrated Microbial Inoculant for Soil, Plants & Agriculture

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Product	EM•1® — Effective Microorganisms®
Identified uses	Soil conditioner · agriculture · microbial inoculant · animal husbandry
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Prepared by	EMRO USA — technical protocols

The original soil probiotic: a multi-strain culture of beneficial lactic acid bacteria that restores soil biology, unlocks nutrients, strengthens plants and suppresses pathogens — activated on-farm and applied through existing equipment.

1. PRODUCT DESCRIPTION

EM•1® is the original soil probiotic — a concentrated liquid culture of beneficial, naturally occurring, food-grade microorganisms developed by Prof. Dr. Teruo Higa (University of the Ryukyus, Japan, 1982). Applied to soil, seed, foliage or irrigation systems, it shifts decomposition from oxidative decay toward fermentation: building humus, solubilizing bound nutrients, stimulating root and plant development, and competitively excluding pathogens and nematodes. The result is healthier soil, reduced chemical dependency, and a farm that improves season over season.

2. COMPOSITION & GUARANTEED ANALYSIS

Substance / mixture	Mixture — microbial inoculant
Active ingredient	Lactobacillus casei — 1,000,000 CFU/mL
Other ingredients (inert)	Water and organic molasses — 99.99%
Hazardous ingredients	None. No ingredients classified as hazardous to health or the environment.
GHS classification	Not classified · Not hazardous under OSHA HCS (29 CFR 1910.1200)

3. PHYSICAL & CHEMICAL PROPERTIES

Physical state	Liquid
Color	Light caramel
Odor	Sweet and acidic
pH	2.8 – 4.0
Relative density	1.0 (water = 1) · 9 lb/gal at 68°F
Solubility in water	Fully miscible
Boiling point	211.6°F (99.8°C)
Flash point / Flammability	Not flammable or combustible
Viscosity (dynamic, 25°C)	0.89 mPa·s (0.89 cP)
Biodegradability	Readily biodegradable

4. HOW IT WORKS & KEY BENEFITS

- **Soil conditioning** — activates soil biology; produces enzymes, amino acids, organic acids and polysaccharides; converts organic matter to humus; solubilizes bound P, K, Ca and Mg.
- **Plant activation** — stimulates root development, photosynthesis and cell division; beneficial leaf-surface microbes help plants withstand temperature, pest and disease stress.
- **Pathogen exclusion** — competitive exclusion of harmful microorganisms; documented reductions in nematode populations and soil-borne disease pressure.
- **Waste to resource** — accelerates decomposition of crop residues, straw and manure into compost and biofertilizer.

5. ACTIVATION — HOW TO PREPARE EM•1® (5/5/90)

EM•1® is sold as a concentrate in which the microorganisms are dormant. Before use it must be activated. Activation expands the product roughly 20x and lowers the cost per use.

Ingredient	% (v/v)	Per 100 gal batch
EM•1® Concentrate	5%	5 gal
Unsulfured molasses (or sugar)	5%	5 gal
Clean, non-chlorinated water	90%	90 gal

1. Add ~50% of the water to a clean plastic container with a lid.
2. Add the molasses, then the EM•1® concentrate; top up with the remaining water.
3. Mix thoroughly, seal airtight (do not aerate), and ferment 4 – 7 days.
4. Vent excess gas occasionally. Keep above 59°F (15°C) and out of direct sunlight.
5. Ready when pH is below 4.0, the odor is pleasantly sweet-sour, and the color shifts from dark brown to orange-brown.
6. Use activated EM•1® within 35 days.

6. DIRECTIONS FOR USE & APPLICATION RATES

All rates below are expressed as activated EM•1® and are taken from the EMRO USA Protocols. EM•1® integrates into existing irrigation, fertigation and spray equipment.

Row-crop soil program (broadacre)

Program year	Activated EM•1® per acre	Purpose
Year 1 — establishment	~20 gal/acre	Build the microbial foundation
Year 2 — transition	~10 gal/acre	Maintenance & deepening
Year 3+ — sustained	~5 gal/acre	Cumulative soil improvement

Other application methods

Use	Rate (activated EM-1®)	Method & frequency
Foliar spray	3–5% solution	Spray on foliage monthly for plant health & disease prevention
Seed treatment	Mix with seed inoculant	Coat seed before sowing to boost germination & early root vigor
Irrigation maintenance	Regular low-rate injection	Through drip / pivot to reduce biofilm and clogging
Animal husbandry	Dilute surface spray	Manure & bedding management, odor and fly reduction

Home-garden & small-scale soil drench: dilute activated EM-1® at roughly 1:250–1:500 in water (about 1–2 fl oz per gallon) and apply as a soil drench every 1–2 weeks during the growing season; foliar spray at the 3–5%.

7. COMPATIBILITY, STORAGE & HANDLING

Storage temperature	38°F – 100°F (3°C – 38°C). Do not freeze.
Storage conditions	Keep in original, tightly closed container, upright, out of direct sunlight, in a cool, dry, well-ventilated area, away from food and drink.
Shelf life (concentrate)	Store as above; microorganisms are dormant until activated.
Activated product	Use within 35 days of activation.
Incompatible materials	Sodium hypochlorite (bleach), chlorinated water, bactericides, fungicides and oxidizing agents may reduce microbial viability. Do not tank-mix with these.

Safety: Not classified as hazardous under OSHA HCS. No signal word, no hazard statements. Not regulated for transport (DOT / TDG / IMDG / IATA). Always read the SDS before handling.

8. CERTIFICATIONS & REGULATORY COMPLIANCE

Certified Organic	CCOF (California Certified Organic Farmers)
OMRI Listed	Listed since 1994 for use in certified organic production
USDA Certified Biobased	Meets USDA BioPreferred program requirements
Other	Non-GMO • Non-pathogenic • Food-grade microorganisms

9. MANUFACTURER & DISTRIBUTION

Manufacturer	EMRO USA, Inc.
Address	2440 N Coyote Dr, Suite 126, Tucson, AZ 85745, USA
Phone	+1 (866) 773-6768
Email / Web	info@emrousa.com • www.emrousa.com

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