

How effective are Effective

Farmers are always looking for ideas on how to improve the productivity and referred to as “EM”) are currently available around the globe, as a plant growth. EM contains many micro-organisms, mainly lactic acid and of organic matter, among other things. The logic is that this will therefore make research information backing the value of EM is available only on websites that journals. At the same time, many farmers report good results when using

To help understand different viewpoints on the effectiveness of EM, we asked organic farmer (who made the transition from conventional agriculture in Production Systems at the University of Wageningen, the Netherlands, and has



Narayana Reddy

About 25 years ago, I came to know about Effective Micro-organisms and their use in agriculture. Japanese agronomist Teruo Higa modified an age-old technology learnt from his grandmother. Traditionally, farmers had been making a concentrated compost mixture of humus soil from forests, mixed with dry cow dung powder, dry fish meal, jaggery syrup, oil cake and rice bran, with water. This mixture was then injected into organic manures to be applied to soil and crops to improve their quality and check against fungal and viral problems. Building on this practice, Dr. Higa together with a microbiologist developed Effective Micro-organisms, first introduced for agriculture and later on for animal health and sanitary uses.

In my vast experience on my family's five mixed (bio-intensive) farms, I can recommend the use of EM to increase soil fertility and to help suppress harmful organisms from developing there. In particular, I suggest that farmers use EM during their transition from chemical to organic farming. In the first two to three years, we used EM as a 5 percent spray on our crop residues such as maize, rice paddy stubble and sunflower, to make them decompose more quickly. We noticed that by using EM spray, composting is quicker and better. Similarly, when we applied *bokashi* (another EM product) together with farmyard manure, we noticed no fungal attacks and viral diseases on our rice, tomato, bottlegourd, soyabean, gladiolus, banana and papaya. Another EM preparation was very useful in controlling sucking insects on legumes and cucurbits. We have observed

Effective Micro-organisms increase yields and protect crops against pests

better growth in the leaves and stems of crops sprayed with different EM preparations, leading to yield increases of 15 percent, and fewer pest infestations.

Farmers in Erode District, Tamil Nadu, south India, are regularly using EM preparations for soil treatment to check root-rots. Farmers in Raichur District, Karnataka State are using EM to help quicken the breakdown of paddy stubble, as do sugarcane growers in Sivaganga District, Tamil Nadu. The EPPL thermal power company, with 700 acres of hill neem trees (also in Tamil Nadu), found that the germination capacity of their seeds increased from 5 percent at the beginning to 85 percent after soaking their dry fruits in 5 percent EM solution for 24 hours before planting. I myself and over 500 farmers in the area also use EM solution to soak all our seeds before sowing.

Although some farmers produce their own micro-organism mixtures, for example keeping rice gruel near humus rich wet soil for 4-5 days, my fear is that farmers cannot identify any harmful organisms getting into the preparations as they do not have suitable laboratory equipment to segregate them. Therefore I think it is better to get EM stock solution from an authentic laboratory. It is very cheap to use it: in India, the use of EM on one acre costs less than a cup of coffee. Farmers use it 3-4 times a year on all their crops. Nevertheless, it is enough to use EM preparations only in the first 2-3 years during the transition from chemical to organic farming.

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Micro-organisms: Two views

health of their plants. "Effective Micro-organism" mixtures (more often microbial inoculant for farmers to use to help improve soil quality and phototrophic bacteria and yeasts which purport to speed up the decomposition more nutrients available for uptake by plants, and more efficiently. However, sell and promote it, and does not seem to be published in independent scientific EM as an external input in their farms, and continue to use it.

two professionals for their opinion. Dr. Narayana Reddy is a prize-winning (1980), writer and trainer from Bangalore, India. Dr. Ken Giller is professor of Plant extensive experience in soil microbiology research with microbial inoculants.

The fantasy realm of in(effective) micro-organisms – where lies the burden of proof?

Ken Giller

Driving through the tropics these days, or when surfing the internet, I often come across advertisements for microbial inoculant products for use in agriculture with weird and wonderful claims. I have often seen hand-painted signs along the roadside – as far afield as the Philippines or Kenya – advertising Effective Micro-organisms. These are also found on the internet. If you look for further information, Wikipedia (encyclopedia on the internet) rightly states that effective micro-organism (EM) technology is "a scientifically unconfirmed method of improving soil quality and plant growth...". Exactly! There is no scientific support of the positive effects claimed by the EM-technology proponents. Such products should be avoided like the plague!

There is a plethora of new microbial inoculant products coming onto the market in developing countries. Few of these provide clear independent evidence of the efficacy of their products. Even if they do contain a micro-organism that may have plant-growth-stimulating potential, production of good quality inoculants is not easy! The target organisms need to be grown on suitable media in a laboratory. If this is not done under stringently-clean conditions, by trained microbiologists, then it is likely that the cultures become contaminated. Before sale the cultures are often added to a "carrier" medium, such as sterilised peat in which the micro-organisms can survive until added to crops in the field. Again, if non-sterilised carrier media are used, or if the inoculation of the carrier is not done under sterile conditions, the packets of inoculum become contaminated and the inoculant organism can often be undetectable by the time the product is sold to a farmer. By contrast, inoculants of the root-nodulating bacteria *Rhizobium* for use with legumes are subject to stringent quality control. This quality control is conducted by an independent regulatory body in most countries, and products that do not meet the requirements



have to be withdrawn from the market. Rhizobial inoculants are tried and tested and their producers, nearly always, adhere to strict quality standards. The exceptions are where the regulations are poorly developed or non-existent, which gives the opportunity for products of poorer quality to be sold.

Another concern is the whole area of registration of microbial inoculants. Many countries where the commercial agricultural sector is well-established have very strong regulatory requirements that govern the use of microbial products, and in particular those that claim to be useful in controlling pests and diseases. The regulations require a series of rigorous toxicological and environmental tests for products before they can be released onto the market. The lack of such regulations in many developing countries provides an easy market for products that may be difficult to register in those countries with rigorous requirements.

After so long, so much research, and so many disappointments concerning microbial inoculants for promoting plant growth, why do agricultural researchers, development workers and farmers still continue to (re)discover these "miracle" organisms? I think there is a strong analogy with mythology. Having fairies, leprechauns or other types of little people living at the bottom of your garden is a "nice idea". So even though we know there's little evidence that they exist we continue to perpetuate the myths.

Uninformed (and perhaps unscrupulous) businessmen profit from selling ineffective microbial inoculant products to farmers in developing countries who can ill-afford the money or the wastage of their time. The burden of proof of efficacy should lie with the producer and seller of the product. If you know of people selling microbial inoculants in your area where they do not name the micro-organism and have good evidence of their efficacy, maybe it is time to challenge them to produce it!

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