

Effective Microorganisms

The concept of inoculating soils and plants with beneficial microorganisms to create a more favourable environment for plant growth has been discussed for decades by agricultural research scientists. However, the technology behind this concept and its practical application have now been significantly advanced by Professor Teruo Higa, at the University of Ryukyus in Okinawa, Japan.

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Professor Higa has devoted much of his scientific career to isolating and selecting different microorganisms for their beneficial effects on soils and plants. He has found organisms that can coexist in mixed cultures and that are physiologically compatible with one another. When these cultures are introduced back into the natural environment, their individual beneficial effects are greatly magnified in a synergistic fashion. The mixed culture of these microbes is named Effective Microorganisms (EM). EM can be applied as inoculants to increase the microbial diversity of soils and plants which, in turn, can improve soil health and the growth, yield and quality of crops. EM is prepared from cultures of naturally occurring species of microorganisms that are found in natural environments worldwide. EM contains more than 100 species of coexisting microorganisms, but predominantly the genus streptomyces, photosynthetic N-fixers, Lactobacillus, yeasts and molds.

Beneficial effects

There is documented scientific evidence to indicate that EM cultures can suppress soil-borne pathogens, accelerate the decomposition of organic wastes and crop residues and increase the availability of mineral nutrients and useful organic compounds to plants. Moreover, it will enhance the activities of beneficial indigenous microorganisms, like Mycorrhizae, that fix atmospheric nitrogen, thereby replacing chemical fertiliser and pesticides. Actually, EM tends to stimulate the "Rotation Effect", a term used by agronomists to describe the regeneration of beneficial microorganisms and suppression of harmful ones which results from crop rotation. EM cultures have been used effectively to inoculate both farm wastes as well as urban wastes to suppress bad odours and hasten the treatment process. EM has also been used with great success as an inoc-

ulant for composting a wide variety of organic wastes.

Further research and development is being coordinated by the Asia-Pacific Natural Agriculture Network (APNAN). Initially there were thirteen member countries, mainly in Asia but also USA and Brazil. Today, the introduction of EM-technology has also spread to many other countries, even in Europe.

EM-Technology in Pakistan

The author of this article is a member of the APNAN Steering Committee and is responsible for the promotion of EM-Technology in Pakistan. First trials with EM in Pakistan showed very promising results when compared to conventional cultivation. These results encouraged the foundation of the Nature Farming Research Centre (NFRC) at the University of Agriculture in Faisalabad. All technical staff of NFRC have been trained at the International Nature Farming Research Centre in Atami, Japan. Establishment of the Advanced EM-Technology Laboratory made it possible to converse liquid EM culture into a solid product, named "Biokasht", and to produce this product on small-scale. A Research Farm of 5 hec-

tares is used for further trials and "Biokasht" is supplied to selected farmers to grow rice-wheat, cotton, sugarcane, corn and bamboo. Networking between national scientists involved in research and development of the EM-Technology is enhanced by the Nature Farming Research and Development Network.

In future, EM-Technology will be extended to the animal production sector, environmental pollution control and human health. For crop production a large-scale "Biokasht" production unit will also be established so that it can be supplied to every farmer in the country. All these developments indicate that there are very good prospects in EM-Technology for sustainable agriculture without destroying the natural agro-ecosystem by excessive use of chemicals.

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BIOFERTILIZERS IN AGRICULTURE AND FORESTRY

N.S. SUBBA RAO

Third Edition

Conference reports from India. Research findings on organic farming are exchanged intensively in India. Several conference reports have been published recently. Recycling of organic waste and biofertilisers get ample attention.

National seminar on organic farming edited by MM Rai and LN Verma, September 1992, College of Agriculture, Indore. Published by Department of Soil Science, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 482 004, India.

National conference on bio-fertilisers & organic farming, November 1993. Department of Agriculture, Government of Tamil Nadu, Madras, India.

Fertilisers, organic manures, recyclable wastes and biofertilisers edited by HLS Tandon, 1992. Fertiliser Development and Consultation Organisation 204-204A Bhanot Corner, 1-2 Pamposh Enclave, New Delhi 110 048, India.

Biofertilizers in agriculture and forestry.

NS Subba Rao, Third Edition, 1993. This is a standard work on biofertilisers in agriculture and it has been updated and extended to forestry. It gives a good state-of-the-art on biofertilisers and their use. Different microorganisms and green manures are dealt with. However, experiences with inoculation of combinations of microorganisms such as "Effective Microorganisms" as developed by Prof Higa in Japan (see p15 of this newsletter) are not yet included.