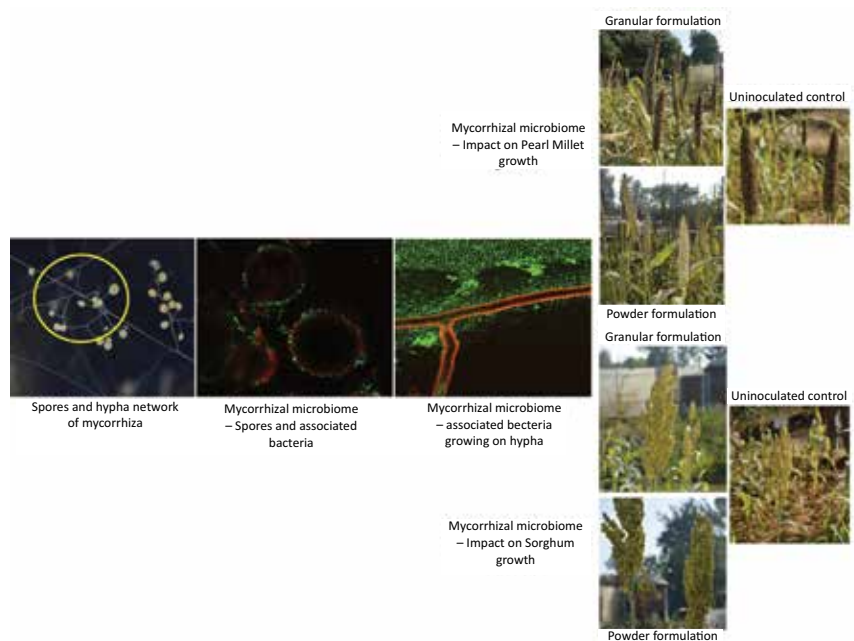


Mycorrhiza and Bacteria-Enriched Microbiomes

For Invigorating Soil and Plant Health

In this article, **Dr Mandira Kochar** tells us about TERI's *in vitro* Mycorrhiza technology that has shown 30–50 per cent reduction in usage of chemical fertilizers in crops such as wheat and maize.

Mycorrhizae are beneficial soil fungi that establish a symbiotic association with host plant roots. In nature, they also associate with bacteria during different stages of their life cycle. Cross-kingdom associations formed between plant roots and mycorrhizae have been proficient in positively influencing plant growth as these associations are evolutionarily selected and maintained in nature, and are hence more powerful than introduced, non-native, combinations of biofertilizer bacterial strains. The Energy and Resources Institute's (TERI) *in vitro* Mycorrhiza technology has shown 30–50 per cent reduction in usage of chemical fertilizers in crops such as wheat and maize. The tiny mycorrhizae spores do not simply exist in soil, but they tirelessly work even in adverse environmental conditions to support plant growth and provide protection to their hosts from pathogens and parasites. Mycorrhizal microbiome contributes significantly to plant nutrition, particularly to the macronutrient, phosphorus uptake. They contribute to the selective absorption of immobile (P, Zn, and Cu) and mobile (S, Ca, K, Fe, Mn, Cl, Br, and N) elements to plants and water uptake through the network between mycorrhiza and its



The impact of mycorrhizal microbiome on the growth of pearl millet and sorghum

associated bacteria.

The Mycorrhiza-based Biofertilizer Market is segmented by geography into North America, Europe, Asia-Pacific, South America, Middle East, and Africa. Each region is further sub-segmented into different countries. In India, commercial mycorrhiza-based biofertilizers are used in large-scale

crop production where they have been shown to result in around 10–20 per cent yield increases with a 25–50 per cent reduction of fertilizer, considering India's low phosphorus soils. With the rising price of phosphate fertilizers and almost 50 per cent of Indian soils being phosphorous deficient, mycorrhiza can play a major role in sustainable farm



fertilization. Given the rising global demand for food and the current rate of soil nutrient extraction brought by increasing use and decreasing worldwide supply, there is a dire need for a sustainable alternative. Mycorrhizal microbiome that can greatly enhance nutrient uptake could thus be a very effective approach to overcome soil degradation and nutrient deficiency crisis. Governments are offering various schemes for encouraging the manufacturers of biofertilizers, besides several initiatives to include biofertilizers in farming practices and bring about a shift from conventional to organic farming practices. These are driving the usage of mycorrhiza-based

biofertilizers. Increased food demand and the need for sustainable agricultural development, impressive efficacy in the growth of important crops are the factors driving the market. This, in turn, has led the mycorrhiza manufacturers to meet the demand-supply gap for these biofertilizers and related innovations.

The TERI Mycorrhiza Mass Production facility complies with the legal and regulatory requirements of FCO and has a production capacity of over 600 billion propagules/annum, expandable to 1000 billion propagules/annum. This can be translated to 16,000 tonnes/annum of the biofertilizer with a minimum capacity of 60 tonnes/day. The products developed at TERI are being commercialized

through joint co-marketing agreements with leading Indian fertilizer companies. Apart from standard product supply, TERI is also actively engaged in developing new product formulation including the soil microbiome components and crop-specific mycorrhizal formulations for the Indian and foreign markets. Many of these formulations are also being tested in several countries which is likely to expand the Mycorrhiza Product Portfolio of TERI and contribute significantly to increasing agricultural productivity while rejuvenating our soils, thereby, achieving sustainability in agriculture. ■

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