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“Competition for Resources in a Changing World:
New Drive for Rural Development”

Soil Microorganisms Improving Productivity of Agricultural Cropping Systems

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Abstract

For the last four decades considerable effort has been invested in investigating the potential of soil microorganisms to benefit agricultural production systems. Microorganisms were tested for their properties to increase plant growth and crop yields or control pests, diseases and weeds. *In-vitro* studies and experiments in controlled conditions revealed some of the mechanisms and mode of action effective in stimulating productivity or causing antagonistic effects. However, results of field experiments have been more variable and few products are actually in commercial use (*Rhizobium*, *Trichoderma* etc.) but with the present raise in agricultural input costs beneficial microorganisms might represent an interesting alternative to complete reliance on inorganic compounds.

At the International Potato Center a research project investigates the use of several genera of native Plant Growth Promoting Rhizobacteria (PGPR) to improve crop productivity of different cultivation systems, ranging from rainfed potato based cropping systems to semi-controlled irrigated vegetable systems to fully-controlled aeroponic systems for the production of disease free pre-basic potato seed. Results indicate that PGPR increase fertiliser use efficiency and photosynthetic activity improving plant growth and tuber yields, especially in systems with organic fertilisation. Yield increases range between 10 and 50%. The effect of PGPR increases with increasing control of growth conditions and reduction of competition from other soil organisms. On-going activities study parameters which might affect microbial performance with the objective to reduce the variability in crop response to the application of microorganisms and develop a low-cost eco-efficient and environmentally-friendly product.

Future activities will also consider the role of microorganisms (fungi) in mitigating abiotic stresses or directly improving the quality of organic fertilisers.

Keywords: Eco-efficient product, fertiliser use efficiency, photosynthetic activity, plant growth promoting rhizobacteria