Short- and mid-term effects of bio-fertilizers on wheat yield and quality in different environments

Project Code
BFNet GBPUAT

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Abstract
In the former phase II of the bio-fertilizer network, bio-inoculants (arbuscular mycorrhizal fungi: AMF and plant growth promoting bacteria: PGPR) were integrated in legume and manure-based wheat-rice and wheat-pulse rotations. GBPUAT will contribute to the new ISCB project phase III by conducting basic (in situ monitoring of bioagents) and field research.

In the previous studies of ISCB bio-fertilizer network, selected strains of AMF and PGPR have been tested for their plant growth stimulation under low-input conditions in the field at multilocations in India. The promising results concerning yield increase and crop quality as well as soil fertility improvement will be further observed in ongoing field trial.

Developed monitoring tools for PGPR by Univrsity. of Neuchâtel will be applied using field samples initially with the help of person from University of Basel and then continuous monitoring will be followed in the midterm field trial at Bhawanipur and Mandori.

New field trials will be set up with another mass multiplied AMF inoculum LL2synth, consisting of four root organ culture (ROC) strains. This inoculum will be tested for plant growth stimulation in exactly the same experimental design as the field trials of phase II had been conducted in (i.e. two fertilizer levels, analogous bio-fertilizer treatments). The experiment will be conducted to find out the best fertilizer doses, which could give the optimum level of yield without sacrificing the benefits of the biofertilizers.

Formulations for PGPR and AMF developed by IIT and TERI will be tested under wheat-rice system by providing inoculum to both the crops. However, the data will be taken from wheat only. The experiments will also be laid out to optimize the application of the bioagents to achieve the maximum benefit from the same.

Furthermore, the remarkable results from phase II concerning the crop yield and quality increase will be validated in the next phase in field trials executed by new and independent Indian partners on “virgin” soils. In addition, demonstration trials will be set up by GBPUAT and TERI in various region of India. There, local farmers can get information and illustration of the performance of biofertilizers in low-input agricultural systems. The input data will also be recorded to evaluate the impact on climate change.

The planned outputs are optimised, self-sufficient, self-regulated wheat-pulse and wheat-rice systems in India, which are less dependent on external inputs such as nitrogen and pesticides. The experiences with this newly developed agri-system will be transferred to farmers. The benefits of the project outcome are not only expected in terms of resource allocation and environmentally friendly production. We assume that marginal farmers will be able to produce crops less costly.

Moreover, we anticipate that due to the higher content of macro- and microelements of the food stable crop wheat, the nutritional situation of the predominantly vegetarian diet of the rural population in marginal areas will improve considerably.