There is a continuous depletion of soil fertility and productivity due to intensive cropping and inappropriate use of chemical fertilizers and irrigation. To overcome this problem, new solutions have to be developed to enhance agricultural production in terms of quality and quantity in a sustainable manner. The development of a biofertilizer addressing the above mentioned problem is the overall objective of the ISCB biofertilizer network. In this context the main task of our subproject was to implement field trials for the validation of selected arbuscular mycorrhizal fungi (AMF) and plant growth promoting bacteria (PGPR) in central India.

Three field sites (viz. Ind 7, Ind 8 and Ind 9) were selected in the village Kajlikheda. The experiments were based on a standard design, jointly developed in the frame of biofertilizer network.

A Random block design was followed distributing 7 treatments, i.e T1 (control), T2 (AMF LL2 natural consortium), T3 (control) T4 (PGPR strains R62 & R81), T5 (combined treatment of T2+T4), T6 (control) and T7 (TERI commercial AMF strain).

The following crop rotations and varieties were chosen for the experiment:

- Ind7: wheat (var. HW2004) - Vigna mungo (var. PDU-1)
- Ind8: wheat (var. JWS 17) - Glycine max (var. JS 335)
- Ind9: wheat (var. JWS 17) - Vigna mungo (var. PDU-1)

In June 2005 the first set of trials, Ind 7 and Ind 8, was planted with Vigna mungo (var. PDU-1) and soybean (var. JS 335), respectively. Due to heavy rains in the month of July 2005, trial Ind7 was partially destroyed by erosion and trial Ind 8 was heavily attacked by insects. Therefore, no data were collected. To avoid future problems with erosion on the slightly inclined field site of Ind 7, an additional site was selected nearby (Ind 9). In autumn 2006 wheat was sown at all three sites. Variety HW2004 was selected for trial Ind 7, variety JWS17 for trial Ind 8 and Ind 9. Seven seed treatments (see above) were applied according to a protocol jointly established by the network partners. Two different levels of fertilization were tested; zero (ZP) and farmers practice (FP) respectively. A number of agronomic parameters, i.e. tiller count, effective tiller count, 1000 grain weight, grain and straw yield, were observed from planting to harvest. No significant difference was found for any of the parameters between the different treatments/ fertilization levels in Ind 7 and Ind 9. In trial Ind 8 treatment T5 (combined treatment of PGPR and AMF) followed by T4 and T7 showed significantly higher straw yield as compared to the untreated control.. During the second year (2006-2007), all the three sites were planted with legume crops, i.e. Vigna mungo var. PDU1 at (Ind 7 & Ind 9) and soyabean var. (JS 335 Ind 8). The following parameters were observed: plant density, number of pods per plants, straw and grain yield. The sowing of legume crop was delayed by about 15 days because of high temperatures. Germination
was very good but due to heavy precipitation the growth of weed was luxuriant and attacks by caterpillars were also observed. This was checked by using agronomic practice and Neem oil spray. In Ind 7, Ind 8 & Ind 9 treatment T2, T4, T5 and T7 resulted in significantly higher plant density as compared to control. Treatment T5 showed the most promising results in both ZP and FP followed by T7 and T2 with regard to number of pods per plant. In Ind 9 a significant positive effect on grain yield was observed with treatment T7, followed by treatments T5, T4 and T2 (und ZP). The legume crop was followed by a set of wheat trials. In field Ind 7, the number of effective tiller was significantly higher in T7 followed by T5 (ZP). Under farmers practice treatment T4 was most effective. In Ind 8, only treatment T5 showed significant response with regard to the number of tillers and effective tiller count (both FP and ZP). In Ind 9 all the treatments showed higher figures for all parameters (?) as compared to the control in FP. After harvesting of wheat crop *Vigna mungo var.* PDU1 was sown at the two experimental sites i.e., Ind 7 and Ind 9. Ind 8 was given up due to some difficulties and farmer's interference.

During the third year 2007-2008, both the sites Ind 7 and Ind 9 were planted with *Vigna mungo var.* PDU1. Treatment T5 showed best performance and significantly higher plant density compared to the control in both trials and under both fertilization regimes the practices (ZP and FP).

A significantly higher number of pods was observed for treatments T5, T7 and T2 as compared to the control in Ind 9 (under FP). No significant difference was found in Ind7. Further, no significant differences were found for grain yield and 1000 grain weight. Subsequently to the legume crop wheat variety HW 2004 was planted in trials Ind 7 and Ind 9 during October 2007. Treatment T5 showed significant higher grain yield and straw weight compared to the control. The results of 3 years field trials show that the application of bioinoculants in combination with the use of farm yard manure and optimal fertilizer doses can significantly improved the quantitative and qualitative production of wheat and legume crops on marginal field sites.