

The positive yield response of field-grown rice to inoculation with a multi-strain biofertiliser in the Hanoi area, Vietnam

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Abstract: A multi-strain biofertiliser was found to provide statistically significant increases in rice yield in two out of three field trials in Vietnam. This biofertiliser contained three strains of bacteria selected from rice rhizospheres in paddies near Hanoi. The benefit possible for rice farmers from application of the inoculant biofertiliser was confirmed as a reliable effect by positive results in 65 farmer demonstrations over three seasons for both summer and winter rice crops, with the increases in grain yield compared to farm areas receiving urea alone usually much greater than 10 percent. Increases in the dose of biofertiliser organisms applied in the range 5.5-22.2 $\times 10^{12}$ cfu ha⁻¹ had no significant effect suggesting that, with suitable quality control to ensure its effectiveness, costs of application could be reduced. The three biofertiliser strains were selected respectively for their ability to reduce acetylene (N₂ fixation), mobilise insoluble phosphates and to favour establishment of the other two under competition from other rhizosphere organisms. There is evidence of significant stimulation of early root and seedling growth and of panicle numbers and seeds per panicle as a result of applying biofertiliser but the precise mechanisms of increases in grain yield remains a topic for future research.

Author Keywords: Biofertiliser; *Citrobacter freundii*; *Klebsiella pneumoniae*; PGPR; *Pseudomonas* spp; Rice

Index Keywords: biofertilizer; inoculation; nitrogen fixation; rhizobacterium; rice; yield response; Viet Nam; *Citrobacter freundii*; *Klebsiella pneumoniae*; *Oryza sativa*; *Pseudomonas*; *Rhizobium*

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