

PGPM-induced defense-related enzymes in aerobic rice against rice leaf blast caused by *Pyricularia oryzae*

ABSTRACT

Rice blast caused by *Pyricularia oryzae* is the most devastating disease especially under aerobic cultivation systems. The bio-efficacy of plant growth-promoting microorganisms: *Pseudomonas aeruginosa* (UPMP1), *Corynebacterium agropyri* (UPMP7), *Enterobacter gergoviae* (UPMP9) and *Bacillus amyloliquefaciens* (UPMS3), *Trichoderma harzianum* (UPMT1) and *Trichoderma virens* (UPMT2) in induction of defense-related enzymes against *Pyricularia oryzae* was evaluated in rice cultivated under aerobic conditions. Under dual culture plate testing, all PGPMs indicated antagonism against *P. oryzae* with percentage inhibition radial growth (PIRG) which ranged from 51.69–81.97 %. The bio-efficacy of the respective PGPM in induction of defense-related enzymes in rice seedlings was evaluated based on individual inoculation before challenged inoculation with *P. oryzae* under greenhouse conditions. Inoculation of all PGPMs significantly reduced rice leaf blast severity at day eight after *P. oryzae* inoculation. The reduction in rice leaf blast disease severity was associated to the increase of peroxidase (PO), polyphenol oxidase (PPO) and phenylalanine ammonia-lyase (PAL) activities in rice seedlings when pre-inoculated with PGPMs. The highest leaf blast disease reduction (59.17 %) occurred with rice seedlings pre-inoculated with *C. agropyri* (UPMP9), followed by *P. aeruginosa* (UPMP1) (40.65 %), *T. harzianum* (UPMT1) (42.23 %), *T. virens* (UPMT2) (20.85 %), *E. gergoviae* (UPMP9) (17.84 %) and *B. amyloliquefaciens* (UPMS3). The high efficiency of PGPM in leaf blast disease suppression was associated with significant increase in total microbial activity (FDA hydrolysis) in rhizosphere soil (4.80–7.86 µg/g/0.5 h) compared to the control (2.25 µg/g/0.5 h). Thus, the application of PGPM is a potential alternative approach in rice leaf blast disease management of aerobic rice.

Keyword: Plant growth-promoting microorganism; Aerobic rice; Rice leaf blast; Defense-related enzymes; *Pyricularia oryzae*