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Screening Rhizobacteria for Growth Promotion and Leaf Blast Suppression (*Magnaporthe oryzae*) on Aerobic Rice in Brazil

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Rice blast caused by *M. oryzae* [(T.T. Hebert) M.E.] (*Pyricularia grisea* (Cooke) Sacc.) has the potential to cause 100% grain yield loss, depending upon the degree of cultivar resistance, planting time and climatic conditions. Rhizobacteria utilize specific mechanisms to colonize roots of host plants, and their use has been widely increasing in agriculture, because it offers an alternative disease control method and growth promotion (Choudhary et al., 2007). The objective of this investigation was to identify rhizobacteria showing potential for plant growth stimulation and resistance induction under greenhouse conditions. The rhizosphere bacteria from rice plants were collected in soils of the Amazon basin in the municipalities of Paragominas and Dom Eliseu, PA. Out of 148 isolates eighteen were selected based on the capacity to promote plant growth and to reduce leaf blast severity when drenched before challenge inoculation with *M. oryzae*. To confirm the potential to reduce disease severity, a third experiment was conducted using three replications and three application methods (drenching the soil, 15 and 2 days, and spraying two days before challenge inoculation) of the two isolates, R-46 and R-55, under controlled conditions in the greenhouse. Also, the enzymatic tests were conducted to quantify the presence of proteins related to pathogenesis "PRP's" during the induction process of resistance by rhizobacteria. Out of 148 isolates evaluated in massal screening for promotion growth, 12.7% stimulated Length of aerial part (LAP), 52% length of root (LR), total biomass (TB) and total root (TR) resulting in a gain of 10.07 cm (22%) on LAP, 11.83 cm (60.02%) on LR, 31.37 g (47.45%) to TB and 1.5g (45.83%) on TR. Two best rhizobacteria isolates (Rizo-46, and Rizo-55) when inoculated to prior challenged inoculation reduced to 90% leaf blast severity when compared with non-inoculated control. The capacity to suppress leaf blast by isolates Rizo-46 and Rizo-55B varied according to the mode of rhizobacteria application. The enzyme activity of peroxidase (POX) was found to be greatly increased, followed by β-1,3-glucanase (PR2), and chitinase (PR3). The same results were also obtained in greenhouse tests with reference to leaf blast severity. These results conclusively showed the increased enzymatic activity when Rizo-46 was inoculated by drenching the soil 15 days before challenge inoculation and Rizo-55B was sprayed two days prior to challenge inoculation.

Reference:

Choudhary, D.K., Prakash, A. and Johri, B.N. 2007. Induced systemic resistance (ISR) in plants: mechanism of action. Indian J. Microbiol. 47:289–297.