

PatcharapornThampiban-Udom 2014: Application of Beneficial Bacteria for Reducing Rice Sheath Blight, Increasing Yield and Decomposition of Rice Straw. Master of Science (Plant Pathology), Major Field: Plant Pathology, Department of Plant Pathology. Thesis Advisor: Associate Professor Chiradej Chamswarnng, Ph.D. 112 pages.

Bacteria with high potential to inhibit mycelial growth of *Rhizoctonia solani*, a causal agent of rice sheath blight were evaluated for the efficacy to promote the growth of rice seedling. Rice seeds (var. Chainat 1) were soaked in bacterial cell suspension (10^8 CFU/ml) for 24 hrs, incubated for 24 hrs before planting in the cement circular well (80 cm in diameter, 0.5 m^2) contained with paddy field soil. The results revealed that beneficial bacteria isolate RRK1 was the most promising isolate which provided the highest percentage of seed germination (96.8%) and the longest root length of 21-day-old seedlings (17.6 cm). The bacterial isolate RRK1 effectively produced cellulase by providing 1.37 cm-width of clear zone on carboxy methyl cellulose agar. Beneficial bacteria isolates RRK4 and RRK1 gave the high efficacy to control sheath blight at 14 days after pathogen inoculation by reducing 36.52and36.43% of disease incidence. Beneficial bacteria isolate RRK1 promoted plant growth and increased yield by providing the highest number of plants (22.77 plant/hill) and panicles (20.63 panicle/hill) or with 21.31 and 16.23% of increments, respectively when compared with a control. Moreover, this bacterial isolate also increased the yield with $624.10\text{g}/\text{m}^2$ (998.56 kg/rai or $1,600 \text{ m}^2$), which was increased by 28.92% as compared with a control. After fermentation of rice straw at 7 and 14 days the result showed that beneficial bacteria isolate RRK1 provided the highest rice straw decomposition efficiencies with 48.00 and 57.76%or 137.15 and 144.95 % of decomposition increments when compared with the control.

Antibiotic (100 ppm rifampicin,Rif) resistant beneficial bacteria were tested for the efficacy to inhibit mycelial growth of the pathogenic fungus, *Rhizoctonia solani* on potato dextrose agar (PDA). At 2 and 3 daysafter testing,bacteria isolate RRK1-Rif inhibited the mycelial growth of *R. solani*by 59.7and 66.29 %.The powder formulation of beneficial bacteria isolate RRK1-Rif and *Trichoderma harzianum* strain 01-52 pellet formulation gave the high efficacy to control sheath blight at 14 days after pathogen inoculation by reducing 42.00and38.24% of disease incidences. These bioproducts also promoted plant growth and increased yield by providing the higher numbers of plants and panicles per hill, while both of them increased the equal yields with $1,280.99 \text{ kg/rai}$ ($1,600 \text{ m}^2$), which were increased by 46.47% as compared with a control.

Student's signature

Thesis Advisor's signature