

Petchpikul Vangmoon 2010: Role of Chitinolytic Bacteria for Biological Control of Sheath Blight on Rice. Master of Science (Agricultural Biotechnology), Major Field: Agricultural Biotechnology, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Chiradej Chamswarn, Ph.D. 107 pages.

Chitinolytic bacteria were isolated from the roots of rice plants randomly collected from natural rice field by using tissue transplanting technique on a chitin agar selective medium. From the total of 75 isolated chitinolytic bacteria, 49 isolates were gram positive. All gram positive isolates were further tested for colloidal chitin digestion and the mycelial growth suppression of *Rhizoctonia solani*, a causal agent of rice sheath blight. Two groups of chitinolytic bacteria were indentified, the first group comprised of 10 isolates with high colloidal chitin digestion activity and high percentages of *Rhizoctonia* mycelial growth suppression (57.8-64.9%). Another 10 isolates of the second group were the chitinolytic bacteria with moderate colloidal chitin digestion activity and 23.3-57.1% of *Rhizoctonia* mycelial growth suppression. Most of selected bacterial isolates for provided rice growth promotion and root colonization efficacy. Also, some selected isolates were developed for the resistance to 100 ppm rifampicin antibiotic while *Rhizoctonia* mycelial growth suppression efficacy remained.

Investigations on pathogenicity and expression of chitinase specific activity were conducted during 0-10 days after the inoculation of *R. solani* at the basal part of leaf sheath of 45 day-old-plant. Results indicated that the chitinase specific activity in rice leaf was increased between 15.9-47.5 U/mg protein during 2-7 days after inoculation of *R. solani*.

The experiment for inducing resistance in rice against sheath blight was conducted by drenching of rice plant with cell suspension of rifampicin resistant mutant chitinolytic bacterial isolates PT1-3M, PT7-1M, PT9-1M, PT10-9M, PT20-10M, PT24-3M, PT25-6M, PT49-9M, PT56-4M and PT70-8M prior to the inoculation of *R. solani*. Almost all isolates reduced sheath blight with disease incidence 62.4-68.3 % which were significantly lower as compared to a pathogen inoculated control (70.4%). All chitinolytic bacteria isolates promoted growth of rice plants by increasing plant height, root length and yield of rice. The mutant isolate, PT56-4M not only induced high chitinase specific activity in plant, but also effectively promoted growth and increased yield of rice as well.

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Thesis Advisor's signature