

Siriwan Rungin 2012: Plant Growth Promoting Effects by A Siderophore-Producing Endophytic *Streptomyces* and its Mutant. Master of Science (Genetic Engineering), Major Field: Genetic Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Arinthip Thamchaipenet, Ph.D. 131 pages.

Siderophores are ferric iron chelating naturally produced by microorganisms. They can help scavenge iron in soil into a form that plants can use. They can promote plant growth and increase resistance against plant pathogens. In this study, 56 endophytic actinomycetes from GMKU culture collection were investigated for siderophore production and phosphate solubilization. The results showed that 36 strains produced siderophores and 12 strains could produce siderophores and solubilized phosphate. The siderophore-producing *Streptomyces* sp. GMKU 100 was selected to disrupt *desD* gene involved in siderophore production. *DesD* gene was amplified by PCR and subsequently cloned into conjugative vector, pIJ8671, to obtain pIJ8671/*desD*. Gene disruption was performed by intergeneric conjugation between *E. coli* ET12567/pIJ8671/*desD* and *Streptomyces* sp. GMKU 100. The mutant was obtained which does not produce siderophore indicated that *desD* is involved in siderophore production of *Streptomyces* sp. GMKU 100. Analysis of 16S rDNA gene of *Streptomyces* sp. GMKU 100 revealed 99.9% similarity to *Streptomyces somaliensis* NBRC 12916^T and *Streptomyces albidoflavus* DSM 40455^T. From effect of plant growth promotion, *Streptomyces* sp. GMKU 100 enhanced seed germination when inoculated in seeds of mungbean and rice with or without iron (10 μ M ferric citrate) and increased root and shoot elongation as well as fresh/dry weights of root and shoot from both mungbean and rice plants growing at 2-4 weeks. The enhancement of plant growth was statistically significance when compared to plants inoculated with siderophore-deficient mutant and uninoculated plants. The result indicated that siderophore produced from *Streptomyces* sp. GMKU 100 isolated from rice plant could promote growth not only for rice plant but also for mungbean plant. Furthermore, *Streptomyces* sp. GMKU 100 could be re-isolated from roots and shoots of both plants which supported that it is a true endophyte.

Student's signature

Thesis Advisor's signature