

Chaisit Preecha 2009: Formulation Development and Partial Characterization of Mechanism Conferred by *Bacillus amyloliquefaciens* KPS46 Against Soybean Disease. Doctor of Philosophy (Tropical Agriculture), Major Field: Tropical Agriculture, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Sutruedee Prathuangwong, Ph.D. 117 pages.

Protocols of *Bacillus amyloliquefaciens* KPS46 mass production in liquid fermentation of soybean meal and molasses or fish meal and molasses that cross linked matrix with several inexpensive organic carriers including dry cow dung, talcum, decomposed cow dung, or rice husk ash dust were developed. KPS46 survived in one selected formulation, a talcum-based product at  $8.4 \log_{10}$  CFU/g for 360-day storage at room temperature ( $28 \pm 4^{\circ}\text{C}$ ) that declined to approximately 31.5% of original cell population. Greenhouse and field experiments with KPS46 wettable powder-based talcum consistently enhanced biocontrol efficacy against important soybean diseases of seedling blight (caused by *Sclerotium rolfsii*), anthracnose (*Colletotrichum truncatum*), and bacterial pustule (*Xanthomonas axonopodis* pv. *glycines*) that were comparable to its fresh cells prepared. The developed formulation also increased marketable soybean yield in two-crop season field trials with 24.1 and 29.5% respectively compared to nontreated control. The formulation can develop a role of scale-up KPS46 production and stabilization of final effective biomass. The UV mutagenesis generated *srfAA* mutant strain M6 of KPS46 was unable to produce lipopeptide surfactin and cellulase. The M6 mutant also produced relatively low levels of extracellular enzymes, endoglucanase and protease compared to KPS46 wildtype. When soybean plant assays were employed under greenhouse conditions with these *srfAA* mutant and wildtype against *X. axonopodis* pv. *glycines*, strain M6 mutant significantly exhibited less effects on disease reduction compared with the parent wildtype. This result suggests that KPS46 reduced bacterial pustule severity on soybean is associated with its lipopeptide surfactin production that *srfAA* also effects the phenotypes of down regulated extracellular-enzyme production.

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Thesis Advisor's signature

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