



## CHAPTER 5

### CONCLUSIONS

Forty-five bacterial isolates were obtained from infected pathumma rhizome. Among these, ten isolates were identified as *Enterobacter* spp. and *Pseudomonas* spp., these bacterial isolates were able to cause wilt disease in pathumma plants and survive in soil without host more than 1 year. In addition, *E. asburiae* PT1J demonstrated bacterial adhesion and physical changes in plant tissues.

An agar diffusion method was conducted to screen antagonistic bacteria for biological control of wilt disease of pathumma. Among 105 bacterial isolates, only four isolates namely SP15, SP38, SP46 and SP58 which were *Bacillus subtilis*, *Pseudomonas mosselii*, *Pseudomonas mosselii* and *Pseudomonas aeruginosa*, respectively, displayed the highest production of inhibiting substances. The optimal conditions of inhibiting substances from the isolate SP15 was 30°C at pH 8 in modified TSB medium containing 0.5% (w/v) glucose and 2% (w/v) peptone, SP38 was 25°C at pH 7 in modified TSB medium containing 0.5% (w/v) sucrose and 2% (w/v) peptone, SP46 was 25°C at pH 7 in modified TSB medium containing 0.5% (w/v) glucose and 1.5% (w/v) peptone, and SP58 was 25°C at pH 7 in modified TSB medium containing 0.5% (w/v) sucrose and 1.5% (w/v) peptone. Moreover, all antagonists could produce both hydroxamate-type and catecholate-type siderophores and three strains including *Ps. mosselii* SP38, *Ps. mosselii* SP46 and *Ps. aeruginosa* SP58 showed the ability to produce phenazine derivatives.

Wilt disease reduction by antagonistic bacteria was assessed in greenhouse study, it was found that the disease incidences of pathumma plants treated with antagonists were decreased by 70-100% and the amounts of pathogenic bacteria were declined by 25-40% on average while the amounts of antagonistic mixture were declined by 5-15% on average. In addition, this research revealed that the use of antagonistic bacterial strains should be applied before pathogens were dispersed. For the study of designation of mixed culture products, the optimal liquid and dry formulation bio-products for all antagonists were molasses and soil, respectively. Ultimately, it was expected that these antagonistic bacteria be useful in wilt disease management in agricultural fields in the future.