Three genera of \( N_2 \) fixing bacteria, \textit{Azotobacter}, \textit{Beijerinckia}, and \textit{Azospirillum} were isolated from rhizosphere soils of rice, corn, and sugarcane plants in the cultivated areas in the northern, central, and north eastern regions while those from Chiang Rai and Petchaboon provinces were used for isolation of phosphate solubilizing fungi. Nitrogen depleted medium was used for isolation of \( N_2 \) fixing microbes and screening of the effective \( N_2 \) fixing isolate by acetylene reduction assay. The medium for isolation and screening of phosphate solubilizing fungi contained \( Ca_2(PO_4)_2 \) as the P source. The selection of the effective phosphate solubilizing fungal isolates were based on the following parameters; colony clear zone ratios, acid phosphatase production, and the amount of soluble P released from insoluble \( Ca_2(PO_4)_2 \) in liquid medium. The total numbers of the isolates from each type of soil microbes were obtained as following; \textit{Azotobacter} 30 isolates, \textit{Beijerinckia} 30 isolates and \textit{Azospirillum} 57 isolates, and phosphate solubilizing fungi 6 isolates. There were no significant difference in the efficiency of nitrogen fixation among all isolates from each of \( N_2 \) fixing bacterial group. Anyhow, the best isolate from each group had about 50-700 times better acetylene reduction activity than the rest. All isolates of phosphate solubilizing fungal isolates differed significantly from each other for the
acid phosphatase production and the amount of soluble P released from Ca₃(PO₄)₂. Each of the effective N₂ fixing bacterial isolate and phosphate solubilizing fungus were inoculated in compost and incubated for 2 – 4 weeks by using 10⁸ cfu of each N₂ fixing bacterial isolate per 1 gram of compost and rock phosphate was added into the compost together with phosphate solubilizing fungal inoculation. It was found that at 4 weeks after incubation, the addition of N₂ fixing bacteria either alone or in combination with P solubilizing fungus did not have significant effects on N concentration of the compost at 4 weeks after incubation as compared to that of the control without bacterial inoculation. Significant reduction of N concentration was observed in the compost with the addition of P solubilizing fungus. Addition of phosphate solubilizing fungal isolate increased significantly the content of available P in the compost as compared to uninoculated control. Combined inoculation of N₂ fixers and phosphate solubilizer had better effect than single inoculation on available P content of the compost at 4 weeks after inoculation. The addition of molasses to the compost together with dual inoculation of N₂ fixers and phosphate solubilizer resulted in significant decreasing of total N and available P content of the compost as compared to that of the compost without molasses addition.