Title : Determination of soil nutrient property and *Brassica oleracea var. alboglabra* growth in lactic acid bacteria and *bacillus* spp. fermented soil

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ABSTRACT

Soil quality is a fundamental factor in agricultural productivity, directly influencing crop growth and yield. However, excessive chemical uses in modern agriculture have led to soil degradation with lower nutrients. Utilization of microorganisms for soil restoration, by degradation of complex organic matters and enhancing solubility of them for effective absorption, is considered as sustainable quality improvement. For this reason, we aimed to evaluate the capability of *Bacillus* spp. and lactic acid bacteria (LAB) that were isolated from agricultural soils in Chiang Mai to improve the quality of degraded soils and preliminary effect on the growth of *Brassica albroglabra* or Chinese kale. Seven bacterial isolates, including *Bacillus subtilis* C5, *Limosilactobacillus fermentum* V3, *Bacillus proteolyticus* ET11, *Bacillus cabrialesi* P5, *Calidifontibacillus enzurumensis* P12, *Bacillus tequilensis* P14 and *Lactiplantibacillus argentoratensis* A11, were individually mixed with degraded soils while MARS liquid medium and 0.85% NaCl were used as the control. Total amount of nitrate ions, solubilized phosphorus, potassium, electrolytes, pH, soil texture and total organic matters in fermented soil were examined. By preliminary screening of those isolates based on their ability to produce enzymes and phosphate solubilization on solid medium, *Bacillus* spp. (high production of cellulase and P solubilizing) mixed soils showed the better values of nitrate, solubilized phosphorus, and total organic matters than LAB mixed soils and control at 45 days of fermentation. In addition, three formulae of those bacteria, were combined for initial development and assessed for stimulation of Chinese kale for early and late growth at 15 and 30 days. Fermented soil with *Bacillus* spp. mixed with lactic acid bacteria were able to stimulate overall growth of shoot, root, and stem better than control (water mixed soil) at least 3 times at 15 days but no significant of shoot and stem lengths were different at 30 days. However, the formula that combined soils with LAB only, especially V3, was not able to promote plant growth and seemed to reduce the pH of soil to be more acid (pH 6 to 3) which the kale could not tolerate during the first 5 days. However, this research was focused on the possibility of utilizing those bacteria to improve the quality of soil and these preliminary findings will be deeply examined and developed for specific applications. Formulation of bacterial biofertilizer or soil amendment may need further selection from several characteristics of bacteria.