

Abstract

The objective of this study was to research and development bio-substances for economic plantation. Four experiments were investigated. The results concluded

(1) Liquid media containing soybean flour, 20.3 g/L MgSO_4 , 10.2 g/L CaCl_2 and 1.0 g/L MnCl_2 was suitably to increase number of antagonistic bacteria isolates TChC2 and YrIL1 at 2.15×10^{10} and 1.81×10^{10} cfu/ml after 3 days. The carrier for producing bio-pesticide *Phytophthora* fruit rot of passion fruit which consisting isolate TChC2 was 7th formula (20 g carboxymethyl cellulose (CMC) and 980 g talcum), while carrier of isolate YrIL1 was 9th formula (245 g MCC and 5 g MgSO_4). Their cost of each bio-pesticide was 46.5 baht and 102.2 baht/kg, respectively. The highest efficiency of pathogen inhibition was 83.86%

(2) Ten grams of *Clausena excavata* Burm.f powder soaking in 100 ml of 95% ethyl alcohol for 24 hour so 3% concentration of crude extract was sprayed to chili every 7 days in two times. The results showed highly eradicated white mite of chili. The mortality was >95% at 48 hour after sprayed. The next was application of crude extract of *Clausena excavata* Burm.f powder soaking in water, using 4% concentration and spraying at 3 days in four times. Thiers's cost was 1.15 and 0.7 baht/L, while the operation cost was 2.30 and 2.80 baht/250 cc/1 time, respectively. Maintaining of crude extracts for 2 months indicated 100% maximally to eradicate white mite of chili.

(3) Six outputs from research as bio-substances for controlling *Xanthomonas* leave blight of cabbage, foggy eyes leave spot of cos and chinese cabbage, herbal crude extract powder for eradicating white grub, myco-insecticide to control cricket in Gryllidae, and attracting pheromone of diamondback moth showed minimal efficiency at 89% nearly with application of chemicals or another bio-substance in similar property. The capacity of bio-substance for reducing acidity and toxic of arsenic showed good trend to application but it should continually examine. Besides, operation cost of bio-substances from research was higher than chemicals but lower than commercial bio-substances.

(4) The suitable liquid media for increasing *Bacillus amyloliquefaciens*, isolate B15, (1.7×10^{11} cfu/ml) was 5th formula containing 50 g/l of rice bran powder, 20.3 g/l MgCl_2 , 10.2 g/l CaCl_2 , and 1.0 g/l MnCl_2 (cost 3 baht/l) while the carrier was 9th formula which consist of 50 g of rice powder, 8 ml Tween 20 and 5 ml ethanol. The production cost was 102.2 baht/kg so it caused of 4.50 ± 0.1 ml clear zone when examined with *Colletotrichum* sp.; pathogen of post harvest disease of passion fruit. Three microorganisms supporting growth of plant showed *Azospirillum* sp. producing IAA hormone should multiplied in 4th formula of medium (soybean flour, 20.3 g/l MgSO_4 , 10.2 g/l CaCl_2 and 1.0 g/l MnCl_2). The highest concentration of seed was 2.93×10^{11} cfu/ml at 7 days so it cost was 3.88 baht/l. 11th formula of carrier which consist of 50 g corn powder, 8 ml Tween 20 and 5 ml ethanol was appropriate to product the bio-substance and it's cost was 114.6 baht/kg. *Beijerinckia* sp., microorganism to fix nitrogen, showed well

growth (2.5×10^{11} cfu/ml) in 8th formula of medium (peel cassava, 0.027 g/l starch, 0.2 g/l KH_2PO_4 , 0.02 g/l NH_4NO_3 , 0.02 g/l NaCl, 0.02 g/l $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ and 0.2 g/l Peptone) so its cost was 2 baht/l while 20 g CMC mixed 980 g Talcum (14th formula) was suitable carrier to produce 46.50 baht/kg of cost. Actinomycetes, digesting phosphorus and potassium microorganism, showed highest increase in 9th formula of medium containing 50 g molasses, 2 g/l yeast, 0.5 g/l KH_2PO_4 , 0.3 g/l $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$. The cost was 6.43 baht/l. The highest concentration of seed was 1.7×10^7 cfu/ml at 7 days. Both carriers, 12th formula (50 g rice powder, 8 ml Tween 20 and 5 ml ethanol and 4th formula (800 g corn powder, 5 ml soybean oil and 100 g sucrose) were suitable material for producing the bio-substance. Theirs cost were 102.2 baht and 151.63 baht/kg, respectively.

Keywords: Bio-substance, Bio-pesticide, Microorganism, Industry, Highland, Plantation

