

CHAPTER 5

Conclusion and Recommendations

5.1 Conclusions

In this was focus on isolated and characterized the Cd resistant bacteria found in Cd contaminated soil from Mae Sot District, Tak Province, to develop a Cd treatment model by using the immobilized cells and to assess the possibility of applying this model in Cd contaminated areas in the future. Results of this study were concluded as followed:

5.1.1 Cadmium resistant bacteria isolation and identification

Cd concentration in water was lower than detection limit while in soil samples was ranging between 0.22 to 19 mg/kg. High numbers of bacteria were found in low contaminated area (3×10^5 UFC/ g soil). Nutrient agar with 0.5 mM of $\text{CdCl}_2 \cdot 2.5 \text{ H}_2\text{O}$ was used as a selection media for selected Cd resistant bacteria. Homology of 16S rDNA sequence from the selected bacteria were analyzed and identified as *Pseudomonas lundensis*, *Pseudomonas monteilii*, *Alcaligenes faecalis*, *Aeromonas allosaccharophila*, *Aeromonas hydrophila*, *Brevundimonas vesicularis* and *Exiguobacterium acetylicum*. Inhibition zone of *P. lundensis* and *P. monteilii* around 5.5 mm. of disc concentration 10 μl of 0.25M $\text{CdCl}_2 \cdot 2.5 \text{ H}_2\text{O}$ 12.12 mm. and 11.14 mm. respectively. The highest Cd resistant bacteria were classified as *P. lundensis* and *P. monteilii*. This result useful for microbial remediation of Cd in contaminated soils and water.

5.1.2 Efficiency of high cadmium resistant bacteria (immobilization ability and cadmium removal) The immobilized ability of *P. lundensis* (73.37%) was higher than *P. monteilii* (49.79%). In addition, the removal efficiency of *P. lundensis* and *P. monteilii* were not show significantly different in immobilized cell treatment (39.55% and 38.62%). But when we compare with Cd removal efficiency, *P. monteilii* (39.47%) was got higher efficiency than *P. lundensis* (29.40%) in free cell treatment. Therefore, *P. monteilii* was high growth rate than *P. lundensis*. Hence *Pseudomonas monteilii* was the species that should study more about the suitable condition for remediation method in free cell but in immobilized cell *P. lundensis* and *P. monteilii* were suitable.

5.1.3 Biological toxicity test

When compare with other species, bacteria is the one optional for high concentration of Cd in primary remediation include with other method.

5.2 Recommendations

The recommendation for future study;

5.2.1 Soil sample should be collected more in varies type of land used and in varies Cd contaminant in other area.

5.2.2 Other microbes should investigated.

5.2.3 In the communities of bacteria should be study.

5.2.4 Mechanism of cadmium removal in different species of bacteria should be study.

5.2.5 Should study in the natural conditions.

5.2.6 Initial concentration, optimum temperature and pH should be study for high efficiency of Cd removal.