

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

The study on heavy metals removal by *C. odorata* and *V. zizanioides* were conducted in experimental pots of Cd contaminated soil from Mae Sot, Tak province and synthetic soil with Cd, Cu, Pb and Zn added.

From the Cd contaminated soil from Mae Sot, Tak province, concentration of total heavy metals were slightly decreased by time during the growth period (from 30-120) for both *C. odorata* and *V. zizanioides*. The phytoavailability of heavy metal in contaminated soil were in proportion with total heavy metal. Both total metal concentration and phytoavailability was found that concentrations of Zn more than the other three metals (Pb, Cd and Cu). In phytotoxicity study of heavy metals, some effects on *C. odorata* and *V. zizanioides* were observed, the symptom appeared on the plants were chlorosis, curly and scorching in leaves. However, both *C. odorata* and *V. zizanioides* could be survived and grew as can be seen from RGR determination.

The concentrations of all heavy metals were found the highest in roots for both *C. odorata* and *V. zizanioides*. In addition, the same trend was found in both plants that the concentrations as well as total mass accumulated of heavy metals were increased in proportion of age of plants or harvesting time. So, at 120 days of harvesting the heavy metals was the highest concentration in the both plants. Thus, in term of management for Cd removal, the aboveground of plant should be cut to eliminate Cd that had been uptake and allow the plant to regrow.

From the synthetic soil where each of Cd, Cu, Pb and Zn solution were added to make up the concentration of each metals in the soil to be 100 mg/kg above initial concentrations of those metals. Phytoavailability of heavy metals in synthetic soil was decreased when increasing harvest time of the both plants due to most of metals were readily in available form and thus being uptake to plants. As a consequent, phytotoxicity of heavy metals can be obviously observed from their growth rate and the affect of toxicity seemed to be more severe as compared to the plants grown in

contaminated soil. However, the both plants were still able to survive until the end period of experiment (120 days).

Similar to the experimental pots of contaminated soil, the highest concentration of heavy metals was found in the roots of the both plants. However, for Cd accumulation in the plants, opposite result was found in the case of synthetic soil as compare to contaminated soil. *V. zizanioides* appeared to uptake more Cd than *C. odorata* as it can be seen from the higher accumulation of Cd in *V. zizanioides*.

To consider in term of management, the result from contaminated soil might be more suitable since it was mimic the real situation in contaminated site. The results reveal that *C. odorata* may be more suitable for Cd removal from contaminated site.

## 5.2 Recommendations

*C. odorata* is a native plant in which found commonly growing around disused zinc mines in Mae Tao district, Tak province. Moreover, the result from this study also indicated that it could be accumulate higher amount of heavy metal rather than *V. zizanioides*. Therefore, *C. odorata* was recommended to use as a phytoremediation plant in cadmium contaminated site in Mae Sot area.

Moreover, to investigate the equilibrium point of *C. odorata* and *V. zizanioides*, an increase of growth time is recommended.