

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

Conclusions drawn from this study are as follows:

1) Mixed cultures obtained from acclimatized activated sludge could degrade TCE better than pure culture of *Rhodococcus* sp. P3.

2) Corncob and coir could be used as support materials for cell immobilization. Cells were immobilized onto corncob and coir by adsorption mechanism. A scanning electron microscopy (SEM) should be conducted in order to verify this speculation.

3) Immobilization technique improved cells survival resulting in a higher relative percentage of TCE removal from soil by immobilized cell than free cell. Thus, immobilization is a promise cells delivery method for possible *in situ* bioremediation of TCE in contaminated site.

4) Kaffir lime peel could be used as a primary substrate to induce microorganisms to degrade TCE, in which its optimal concentration was 50 mg/kg.

5) An addition of cassava pulp did not stimulate indigenous microorganisms in soil to degrade TCE when kaffir lime peel was used as primary substrate while TCE degradation by indigenous microorganisms was enhanced in cassava amended soil at C:N ratios of 20:1 and 30:1 when toluene was used as primary substrate.

6) The combination of bioaugmentation plus biostimulation did not improve TCE degradation because of a high carbon content (C:N ratio of 20:1 to 40:1) in soil microcosms which was greater than C:N:P ratio of 10:1:0.1 within microbial biomass.

#### **Recommendations**

1) Microbial community in the acclimatized activated sludge and the types of microorganisms responsible for TCE degradation should be classified by Denaturing Gradient Gel Electrophoresis (DGGE).

2) The physical properties of support materials such as carbon content should be analyzed in order to understand the sorption mechanism of TCE to support materials.

3) The effectiveness of inoculum i.e., immobilized acclimatized activated sludge on corncob to degrade TCE should be studied at initial TCE concentrations greater than 100 mg/kg. This way, a maximum concentration of TCE that can be degraded by the inocula used in this study may be obtained.

4) A scanning electron microscopy (SEM) should be conducted to verify the immobilization mechanism.