

## CHAPTER 6

### CONCLUSION AND RECOMMENDATION

The results show that soil act as living filter or medium for treatment of domestic wastewater in horizontal direction at least 20 weeks in order to determine the characteristics of treated soil after contacting with wastewater both physically and chemically and quality of effluent through soil columns as follow:

The physical changes that have been observed are :

1. Khamphaeng Saen treated soil will swell due to the increment of Na and K content.

2. Because of flowing of wastewater, cations and anions and biomass from wastewater may be found highest at 0-5 cm long or in section A and the bottom of soil column only; and much affect concerns about the chemical changes can be concluded as follow:

1. soil pH slightly increased and the effluent from the four soil tested series also slightly alkaline and was higher than the influent;

2. soil total kjedahl nitrogen content increased in treated soil series. While the  $\text{NH}_4\text{-N}$  and  $\text{NO}_3\text{-N}$  could be found in very minute or trace quantities in Pak Chong, Muak Lek and Ban Bung treated soil. Contrary,  $\text{NO}_3\text{-N}$  content in treated Khamphaeng Saen soil was leaching and  $\text{NH}_4\text{-N}$  content slightly increased. In fact, the quantities of  $\text{NH}_4\text{-N}$  should be greater than the observed value, but the nitrification process changed the  $\text{NH}_4\text{-N}$  to  $\text{NO}_3\text{-N}$ . The concentration of  $\text{NO}_3\text{-N}$  in the Muak Lek, Pak Chong and Ban Bung effluent supported the previous assumption. And the concentration of  $\text{NO}_3\text{-N}$  in Muak Lek soil was greater than 10 ppm which is the maximum regulation value of the US public health;

3. phosphorus adsorption and/or precipitation in the form of Ca-P is a well-established process and could account for



storage of orthophosphate from wastewater. The quantities of total-P was higher than the amount of extractable-P especially in the four treated soil particularly, Muak Lek and Ban Bung soil series. In fact, the quantity of extractable-P in treated Muak Lek and Ban Bung soil should be greater than the observed value but it could be found orthophosphate in the effluent from Muak Lek and Ban Bung soil again at the week-5;

4. soil exchangeable K increased in the three-treated soil except Kkamphaeng Saen soil and K content in effluent from the four soil series were higher than the influent after week-2;

5. soil exchangeable Ca increased in the three treated soil except Ban Bung soil, while the amount of total Ca in effluent from Muak Lek and Pak Chong soil were sharply higher than the influent. But their content from Ban Bung and Khamphaeng Saen effluent were lower than the influent at week-8 and week-14;

6. soil exchangeable Na increased in the four treated soil while Na content in effluent from four soil series were higher than the influent at week-15;

7. the treated four soil could be retained  $\text{SO}_4$  and Cl ions from wastewater; and

8. the four treated soil could be retained E. coli while it was not found E. coli in all effluent.

#### Suggestion and Recommendation

1. The deficiency of fixed from of K ion in treated soil may occur after continuous passing of wastewater resulted by soil K released. And high level of Na accumulated in soil may alternate soil structure.

2. The deficiency of available-P may occur in loamy sand and sandy loam soils in case of passing wastewater through certain soil for a long period of time.

3. In order to avoiding pollution water resources,



effluents from soil series could be applied for plant nutrient. They have  $\text{NO}_3\text{-N}$ , orthophosphate and K ions.

4. E. coli could not be found in all effluent, it means that no pathogenic bacteria in the effluent. Therefore, land treatment with domestic wastewater in horizontal direction may not conducted the adverse effects to groundwater.

5. Good mixing soils in order to improve physical characteristics and chemical constituents could be used for domestic wastewater treatment in horizontal direction for a long time and soil clogging would not occur. In conclusion, it may say that treated soil and its effluent have adequate levels of plant nutrients. Thus, the soil-plant system may be good for treatment of domestic wastewater. In addition, constants of other toxic agents i.e., heavy metals, in the influent and the soil showed not be in dangerous level.

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