CHAPTER 5

Conclusion

Nowadays wastewater treatments become expensive amenity in the developing countries and needed to develop the low cost wastewater treatment method to prevent the wastage of energy and investment. Obtained results confirmed that up scaling of pilot scale AS – FAMCW wastewater treatment system will be suitable solution for achieve above target successfully.

The average removal efficiencies of BOD, TSS, NO_3-N and NH_4-N in AS-FAMCW system in series increased with an increase in HRT. Average removal efficiency of *o*-PO_4^{3-} in AS was highest at the shortest HRT. Limited amounts of dissolved oxygen level triggered an increase of NH_4-N concentration in FMACW. AS system greatly involved treating, the organic matter contained in wastewater and FAMCW system was facilitated to treats the left of nutrients contained in wastewater.

It was observed that the 88.3% of the BOD was removed in 18-h HRT at AS while FAMCW removed BOD only 42.7% hence greatest potion of BOD removed at AS system. At 18-h HRT condition provides plenty of time for particles to settle down in secondary clarifier and FAMCW. Results indicated that higher HRTs enhanced the NO_3-N removal efficiency than lower HRTs. FAMCW recorded higher NH_4-N concentration than in the AS system in 6- and 12-h HRTs due to the dissolve oxygen shortage. Expanding of FAMCW surface area or use of aeration can enhance ammonia nitrogen removal in FAMCW.

Maximum relative growth rate of water hyacinth was found in 12-h HRT while lowest RGR was obtained in 18-h HRT. The 18-h HRT case illustrated highest removal efficiency of nutrient at FAMCW and had low growth rates for water hyacinth.

Results of the mathematical modeling confirmed that BOD concentration was rapidly decreased at 18-h HRT. Highest BOD degradation coefficient was recorded at 18-h HRT. Also first order process take place at HRT 06 & 12 while zero order process take place at HRT 18. It can conclude that BOD degradation at HRT 18 depend on microbial cell number while BOD degradation at HRT 12 and 6 independent from microbial cell number. According to the multiple correlation analysis and principal component analysis, temperature and pH showed strong positive correlation with BOD and O-PO_4 removal efficiencies in each HRT. Also first and second principal components explained more than 80% of the variance between variables in each HRT.

Final effluent generated from AS –FAMCW operated at HRT of 12 and 18 h were comply with building effluents standards in Thailand (Annexure E) and allowed and safe to discharged into public water resources or the environment. The results confirm that hydraulic retention time is a key factor in determining the effectiveness of wastewater purification in an AS-FAMCW system in series. Moreover, 12- and 18-h HRTs have been found to be optimum to treat the cafeteria wastewater effectively. Hence, it was envisaged that similar strategies could be implemented in other sources of wastewater.

RECOMMENDATIONS

1. Hydraulic retention time is a significant aspect in determining the effectiveness of wastewater purification in an AS-FAMCW system in series. Moreover, 12- and 18-h HRTs have been found to be optimum to treat the cafeteria wastewater effectively.
2. Aeration direction of the aeration tank caused to develop the dead zone in the shallow end of the aeration tank. It is recommended that aeration tube should installed the bottom of tank and air should bubbled from bottom to top in aeration tank.
3. Foam formations in aeration tank greatly decline the efficiency of wastewater treatment. Prevention of foam formation is good practice to obtain higher efficiency of treatment. Filtration of food and oil skim and dosing of anti- foaming agent helps to avoid the foam formation.
4. It is recomcccmended that, to investigate the other factors such as solid retention time, food: microorganism ratio, mix liquor volatile suspended solid concentration, organic loading rate that effect to the treatment efficiency and envisage developing the set of optimum conditions to enhance the treatment efficiency of wastewater treatment plant.