CHAPTER 8

CONCLUSIONS

6.1 Conclusions

6.1.1 Thai microalgal strains grew better than the foreign strain (*N. limnetica* SAG 18.99) in tropical climate. *Carteria* sp. AARL G045 is the best promising strain due to high growth rate and high lipid productivity.

6.1.2 Medium cost for the cultivation of microalgae can be reduced by ten percent of JM when the microalgae are cultivated in AM.

6.1.3 From the effects of nutrients on the growth and lipid production, K_2HPO_4, $MgSO_4.7H_2O$, $NaNO_3$ and NH_4Cl in AM effected the growth and lipid productivity in *Carteria* sp. AARL G045. The optimized component concentration for enhancing the lipid yield was obtained from BBD as follows: NH_4Cl 0.03 $g.L^{-1}$, $NaNO_3$ 2 $g.L^{-1}$, K_2HPO_4 0.4 $g.L^{-1}$ and $MgSO_4.7H_2O$ 1.03 $g.L^{-1}$. Lipid productivity of *Carteria* sp. AARL G045 was 35.04 $mg.L^{-1}$ which was close to the predicted value after cultivated with the optimized medium.

6.1.4 *Carteria* sp. AARL G045 thrived better in CMU03 medium under the natural sun light with higher biomass and lipid productivity than that cultivated in optimized AM. With cheap medium, the cost of lipid productivity could be reduced to approximately, 12 $baht.Kg^{-1}$.

6.1.5 Extraction of lipids from *Carteria* sp. AARLG045 biomass using UASE revealed better results when compared with previous extraction method. The highest

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yield was obtained at the conditions with 4 W of ultrasonic power at 1 MHz for 30 min. The sample powder to the solvent ratio was 1:25, which was the optimal value. The maximum lipid content was 47.43%.

6.1.6 From the GC - MS analysis, the main chemical compounds of the crude lipids were a group of unsaturated fatty acids and represented about 66.84% of the total fatty acid composition.

6.1.7 Partial budget analysis showed that the overall cost of biodiesel from *Carteria* sp. AARL G045 biomass under UASE method was 21.46 baht.L^{-1} which was less than the traditional extraction method about two times. The present investigation indicates the success of the production of biodiesel from algae as a raw material.

6.2 Recommendations

In this research, the growth, biomass and lipid yield of *Carteria* sp. AARL G045 will be obtained with different values if it is cultivated in different time or season. This implies that seasonal variation result in changing some physical factors such as temperature and light which affect the growth and lipid yield. Thus these factors are important which should be considered in open system cultivation.

In addition, the condition of lipid extraction in this study was focused on using low ultrasonic power. Actually, lipid extraction can be operated at high power. The increase in ultrasonic power may result in deriving higher lipid productivities than low power. However, high power needs high energy consumption and it leads to the increase in capital cost. Hence, this research was not only aimed to enhance lipid productivity but also to save energy and reduce the extraction cost.

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