THE OPTIMIZATION OF MICROALGAE GROWTH IN MEDIUM BASED ON PALM OIL MILL EFFLUENT(POME) FROM EFFLUENT OF BIOGAS PLANT OF FELDA SG. TENGI PALM OIL MILL

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ABSTRACT

This paper reports on the effects of carbon dioxide (CO_2) concentration and agitation rate of microalgae in medium based on the effluent of the Biogas Plant Felda Sg Tengi Palm Oil Mill supplemented with palm oil mill effluent (POME) from their facultative pond. The two variable which is CO_2 concentration (x_1) and agitation rate (x_2) are used to optimize the microalgae growth. In the design of 2^2 factorial experiment which was complimented to make a composite design. The linear regression model are used to analyze the 2^2 factorial experiment and distance whether it contains the maximum point. The composite design used to analyze the curvature .The quadratic regression model was used to optimize the microalgae growth based on maximum biomass concentration (x_m). The maximum point for x_m from quadratic regression predicted to be at 16.03% CO_2 and 0.9vvm agitation with the theoretical maximum x_m predicted to be 42.6158 g/l.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

In 1870, oil palm (Elaeis guineensis) was initially acquainted with Malaysia as a decorative plant. Starting from 1960, planted territory had expanded rapidly resulted that in 1985 1.5 million hectares were recorded used as palm oil plantation. The number of land used for palm oil plantation expanded to 4.3 million hectares in 2007 and increasing rapidly to 4.917 million hectares in 2011. The increase use of palm oil has made it as an important commodity crop in Malaysia. Malaysia is one of the big players in exporting products which represents 39% of world palm oil production and 44% of world exports.

As a the product of palm oil industry increase, it will generate a tremendous amount of waste and by-products such as palm oil mill effluent (POME), empty fruit bunch (EFB), palm kernel shell (PKS) and mesocarp fiber in palm oil mill. Only POME will be treated in open ponding system which is economically feasible and simple operational. As in palm oil mill industry POME are the abundant waste among the other waste which contribute to the environmental problem if it is discharged to drain or river. The pollutant consist in POME have make industry to take action on applying of handling and treating POME effluent from biogas plant. There are ways to treat POME and the effective and economical ways are by using pond system.