

## Development of Mass Cultivation System of Tropical Microalgae

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**SUMMARY:** Temperature is one of important factor in growing microalgae. In this research, freshwater samples were taken in Malaysia to isolate suitable candidate of species that are able to grow in POME medium and able to survive under high temperature (40°C). For preliminary result, freshwater samples were taken to check the microalgal species that present in Malaysia. There were three species that successfully isolated and grown in AF-6 medium which are *Ankitrodesmus* sp., *Scenedesmus* sp. and *Chlorella* sp.

**Keywords**— Green Algae, Growth, Isolation, Microalgae

### INTRODUCTION

Microalgae are known as the microorganisms with many advantages such as the ability to conduct photosynthesis, able to remove nutrients and heavy metals, and containing carotenoid, carbohydrate and lipid which are useful to make high value products [1],[2]. Nowadays, there are many researches of microalgae focusing on the production of biofuel, cosmetics, dietary supplement and water treatment [3]. However, in producing large amount of microalgae, efficient and economical mass cultivation system needed to be set up.

Malaysia has tropical weather that is very suitable for growing microalgae which is hot and humid throughout the year. Thus, this could help to cultivate microalgae without installation of heating or cooling system. This research also utilize Palm Oil Mill Effluent (POME) wastewater as medium for cultivating microalgae. This would be an alternative method to reduce the cost of mass cultivation of

microalgae.

### 2. MATERIALS AND METHODS

#### 2.1 Isolation

Freshwater and POME samples were taken in Malaysia. The freshwater samples were observed and some species were isolated using pipetting method [4]. The species were then pre-cultured in 96 well plate under room temperature with 24h of light.

#### 2.2 Growth analysis

The isolated species was observed under microscope to see the growth of microalgae cells. Pure unialgal culture were cultured in 100 mL Erlenmeyer flask with 75 mL AF-6 medium [5] under room temperature and 24h light of 90  $\mu\text{mol photon m}^{-2} \text{s}^{-1}$ . Optical density and chlorophyll content analysis were done using Shimadzu 1800 UV-VIS spectrophotometer.

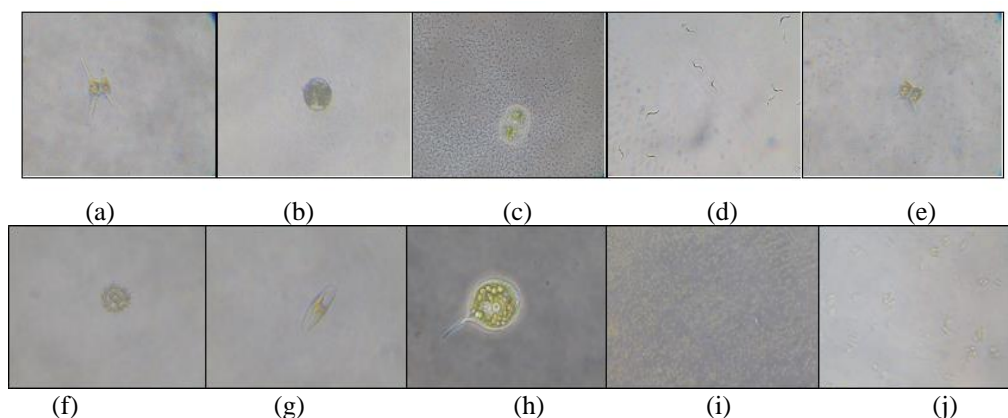


Fig. 1. Isolated microalgae species. (a) *Staurastrum* sp. (b) unidentified sp. (c) *Cosmarium* sp. (d) *Ankitrodesmus* sp. (e) *Staurastrum* sp. (f) *Pediastrum* sp. (g) Diatom group (h) *Phacus* sp. (i) *Chlorella* sp. (j) *Scenedesmus* sp. The species was identified based on morphological identification.

### 3. RESULTS

Fig. 1 shows the photos of microalgae species that were isolated from the freshwater sample taken in Malaysia. About 10 species were isolated using pipetting method in which the species were then identified using morphological identification. The species that were managed to be identified are *Ankistrodesmus*, *Chlorella*, *Cosmarium*, Diatom group, *Phacus*, *Pediastrum*, *Scenedesmus* and *Staurastrum* sp. However, only 3 out of 10 species were able to grow without any contamination which are *Ankistrodesmus* sp., *Chlorella* sp. and *Scenedesmus* sp. Image of pure unialgal culture of *Ankistrodesmus* sp., *Scenedesmus* sp. and *Chlorella* sp. were shown in Fig. 2. The pure unialgal culture species were then cultured for 8 days in 75 ml of AF-6 medium under room temperature with light intensity of  $90 \mu\text{mol photon m}^{-2} \text{s}^{-1}$ . The growth curve were shown in Fig. 3. Among the three species only *Ankistrodesmus* sp. and *Scenedesmus* sp. showed increasing growth curve from day 1 to day 8. Meanwhile *Chlorella* sp. started to decrease on day 2 and increased again on day 4. The curve then decreased again starting from day 6 to day 8. Based on the curve, *Ankistrodesmus* sp. can be seen as the most fast growing microalgae.

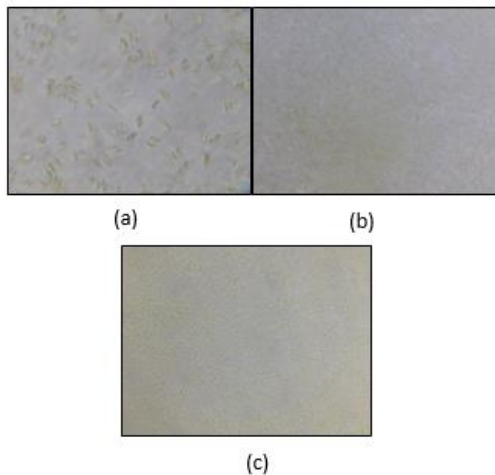


Fig. 2 shows the pure unialgal culture of (a) *Scenedesmus* sp. (b) *Chlorella* sp. and (c) *Ankistrodesmus* sp.

### 4. DISCUSSION

A few freshwater samples were taken as to check on the microalgal species that present in Malaysia. Then, single cell of microalgae that found were isolated in order to check on the rate of growth of the species. However, most of the isolated species which are *Cosmarium*, Diatom group, *Phacus*, *Pediastrum*, and *Staurastrum* sp. cannot be use for the next step due to (a) contamination of AF-6 medium (b) contamination by other species of microalgae in one well (c) species such as *Phacus* unable to grow in AF-6 medium. *Ankistrodesmus* sp., *Scenedesmus* sp. and *Chlorella* sp. managed to survive and the cultured for 8 days. Growth curve for each species was obtained and compared. However, the growth curve for *Chlorella* sp. did not showing a stable growth due to unknown reason. Due to this, more experiments will be done to achieve the objective of this research. For future planning, sample from hot spring will be taken to search for the potential

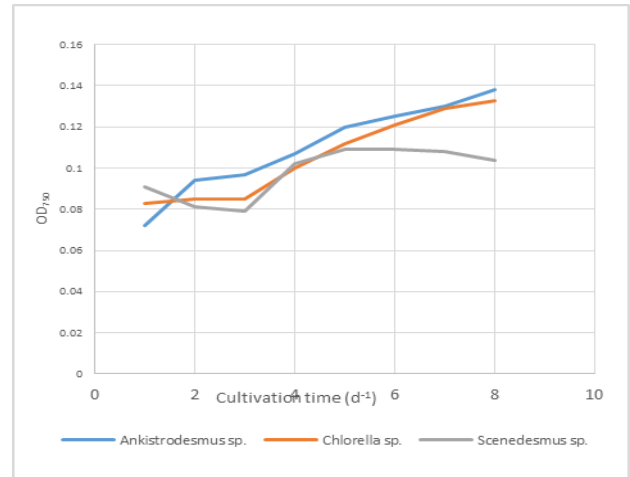


Fig. 3 Comparison of growth curve between *Scenedesmus* sp., *Chlorella* sp. and *Ankistrodesmus* sp.

microalgae species and to culture the species using POME medium. For this preliminary result, it can be concluded that *Ankistrodesmus* sp. is the fast growing type of microalgae.

### ACKNOWLEDGMENTS

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