Comparison of cultivation of *Chlorella* sp. in effluent from rubber processing Blocks rubber and Concentrated latex factories

Students : Miss Arpinya Thongleung and Miss Puttida Leekphai

Teacher : Mrs. Salamiyah Kittibunyatiwakorn

Abstract

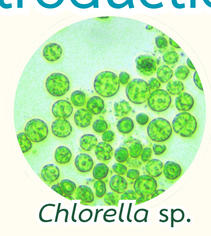
The study "Comparison of cultivation of Chlorella sp. in effluent from rubber processing Blocks rubber and concentrated latex factories" aims to compare the cultivation of *Chlorella* sp. in effluent from rubber processing Blocks rubber and concentrated latex factories, examine the growth rate of *M. macrocopa* that acquired nutrients from *Chlorella* sp., and determine how effective *Chlorella* sp. is at improving the effluent's water quality. In the experiment, we separated the three experimental sets. Initially, the control set consists of MSG residue, field fertilizer, urea fertilizer, and drinking water. The wastewater from the manufacturing of concentrated latex is used in the second set. Blocks of rubber processing effluent are used in the third set. We spent a week in cultivation. On the first day, we fill 250 ml flasks with 100 ml of effluent and modify the water's pH to create the ideal environment for *Chlorella* sp. growth. We pour an additional 150 ml on the third day of the experiment. Every day, we monitored the water quality, counted the quantity of *Chlorella* sp. cells, and modified the temperature, light, and pH. After that, we fed *M. macrocopa Chlorella* sp. for three days. We gathered data on temperature, dissolved oxygen (DO), and surface temperature each day. Every experiment was conducted three times.

So, the results, the growth rates of *Chlorella* sp. from every set are (27.08 ± 1.73), (95.83 ± 0.35) and (29.17 ± 0.48) cells/ml respectively, the growth rates of M. *macrocopa* from every set are (27.08 ± 1.73), (95.83 ± 0.35) and (29.17 ± 0.48) cells/ml respectively, the increasing rates of the weight of *M.* macrocopa from every set are (1.53 ± 1.24, 3.66 ± 1.15 and 3.13 ± 1.84 g) respectively. When data was analyzed statistically, it was found that the three sets of experiments were not statistically different from each other (P<0.05). The water quality before and after the experiment such as pH, from the control set, was 6 before and 7 after, the effluent from concentrated latex processing,was 6 before and 7 after, the effluent from Blocks rubber processing, was 6 before and 6.5 after which is according to the research questions. From the results, the effluent from concentrated latex processing can be an option to replace field fertilizer and urea fertilizer in cultivating Chlorella sp. .

Keywords: *Chlorella* sp./ *Moina macrocopa*/ effluent/ the rubber processing factory

Introduction

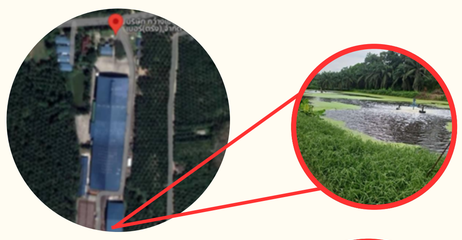
The wastewater



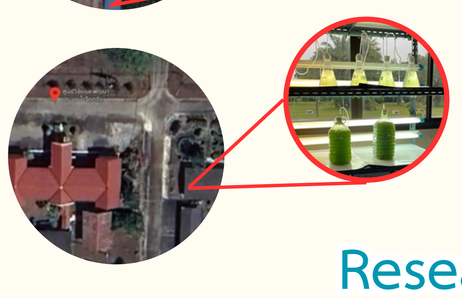
Chlorella sp.

M. macrocopa

Study sites



Guangken Rubber(Trang) Company Limited which is located in Na Mueang Phet Subdistrict, Sikao District, Trang Province



Trang Inland Fisheries Research and Development Center which is located in Na tho Ming Subdistrict Mueang Trang District, Trang Province

Research Question

1.Effluent from which rubber processing affects the growth rate of *Chlorella* sp. the best?

2.Effluent from which rubber processing affects the growth rate of *Moina macrocopa* the best?

3.After cultivating *Chlorella* sp., which sets have the best water quality?

Hypothesis

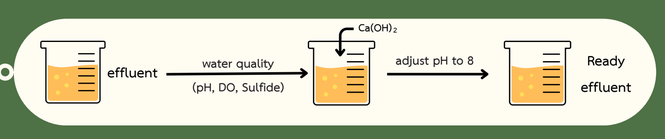
1.The best growth rate appears in *Chlorella* sp. grown in concentrated latex processing effluent.

2.The best growth rate appears in *Moina macrocopa* which was fed with *Chlorella* sp. grown in the effluent from Concentrated Latex processing.

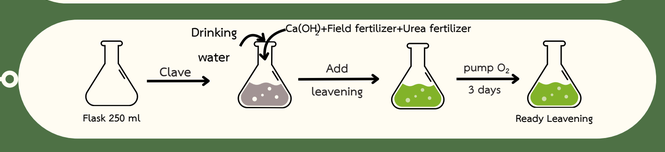
3.After cultivating, the water quality is improved.

Methods

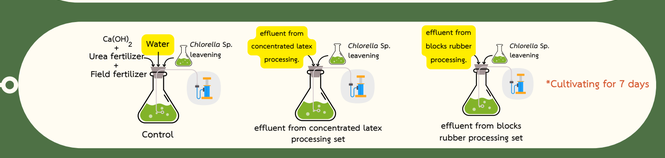
1. Prepare effluent



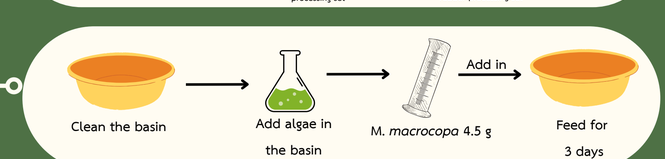
2. Prepare Leavening



3. Cultivating *Chlorella* sp.

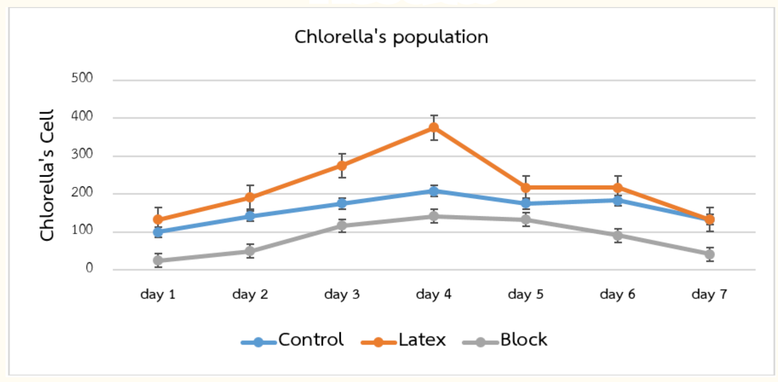


4. Feeding *M. macrocopa*

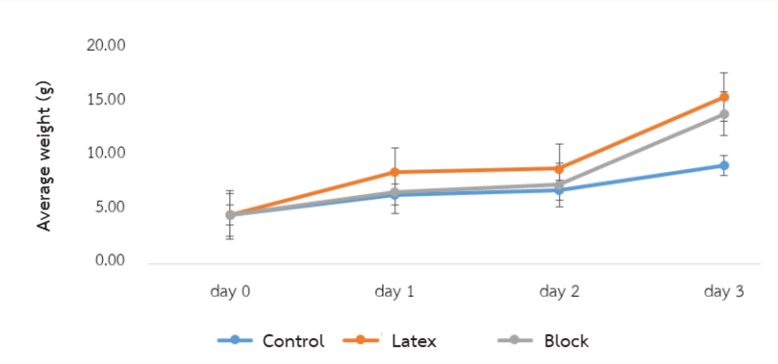


5. water quality after experiment

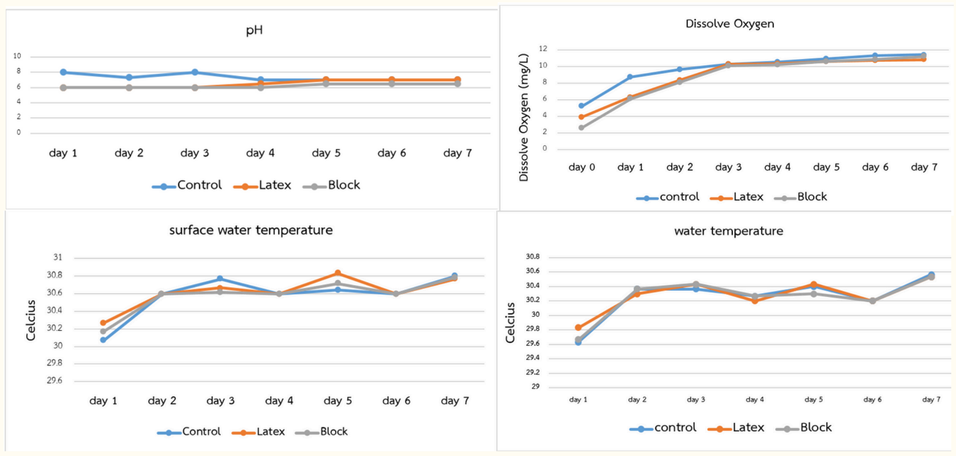
Results



Graph 1 shows the growth rate of *Chlorella* sp. throughout the experiment



Graph 2 shows the growth rate of *M. macrocopa*



Graph 3 shows water quality every day throughout the experiment

Discussion and Conclusion

According to the findings of the study "Comparison of cultivation of *Chlorella* sp. in effluent from rubber processing Blocks rubber and concentrated latex factories," the growth rate of *Chlorella* sp. is altered by the effluent from the rubber processing. The statistical analysis of the data reveals that the third set differs from the control set (P<0.05), whereas the second set does not show a statistically different from the control set (P<0.05). M. *macrocopa* can survive in the effluent when raised. According to statistical analysis, there is no significant difference between any of the sets (P<0.05). The growth rate varies in each set. It may rely on the nutrients, such as phosphorus and nitrogen, the cell's ability to reproduce, its enzymes, chlorophyll, or the process of photosynthesis in each.

The conclusion from the study, “Comparison of cultivation of *Chlorella* sp. in effluent from rubber processing Blocks rubber and concentrated latex factories,” indicates that the best set for *Chlorella* sp. to grow is the effluent from concentrated latex processing. Accordingly, each set contains 159.52±4.74, 220.24±2.88, and 85.71±1.78 cells/ml of *Chlorella* sp. The effluent from the concentrated latex processing set is not significantly different from the control set (P<0.05), according to statistical analysis of the data. However, there is a statistically significant difference (P>0.05) between the effluent from the blocks rubber set and the control set.

Also, the weight of M. *macrocopa* from the second set is the heaviest, the weight from the third set is the second heaviest, and the control set is the least heavy. The average weights from each set are 6.71±1.4, 49.32±1.15, and 8.09±1.84 g, respectively. When analyzing the data statistically, all sets are not statistically different (P<0.05). The water quality, pH, DO, and temperature are better quality and suitable for cultivating Chlorella sp. .

According to the results *Chlorella* sp. can be grown most effectively by the effluent from concentrated latex processing. Furthermore, *Chlorella* sp. makes the effluent's water quality better.

Citations

Tachapol Karaket. (2020). Powdered Dried Chlorella Sp. as Food Source for Water Fleas (Moina macrocopa) Culture. Phitsanulok: Naresuan University. Retrieved from https://nuir.lib.nu.ac.th/dspace/bitstream/123456789/4946/1/ThuchapolKaraket.pdf

Tarinee Sasiboonyarat. (2015). Cultivation of Microalgae in Anaerobic Digestor Effluent from Agro-Industry for Wastewater Treatment and Oil Production. Master of Engineering (Engineering environment). Songkhla: Prince of Songkla University. Retrieved from https://kb.psu.ac.th/psukb/bitstream/2016/11006/1/413395.pdf.

Naritsara Suwannachot. (2014). EFFECT OF NITRATE CONCENTRATIONS ON THE GROWTH OF Chlorella vulgaris. Master of Science Degree (Environmental Science). Nakhon Pathom:Silpakorn University. Retrieved from http://www.thapra.lib.su.ac.th/objects/thesis/fulltext/snamcn/Naritsara_Suwannachot/Naritsara_Suwannachot_fulltext.pdf.