

*Study on the high production system of continuous culture system of *Melosira varians*.*

With special reference to the possibility of application for food production and nutrient removal from water.

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Experimental boxes of continuous culture system of filamentous diatom.



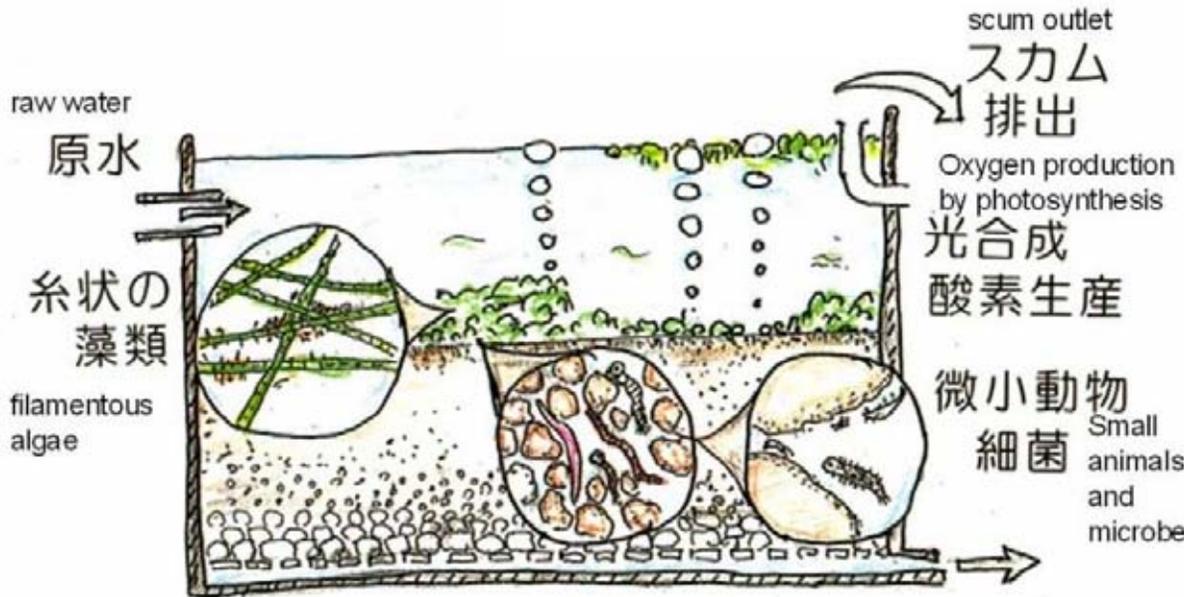
Automatic easy harvest into metal screen net.



Slow sand filter system is not physical filtration system. It is an ecological purification system.



To make artificial clear seepage water in the flood plain of a river.



生物の働きによる安全でおいしい飲み水
Safe and delicious drinking water by biological activity

There is slow water current. Only filamentous form of algae can grow in shallow water. In order to keep active algal growth in this system. Continuous culture system is essential.



Continuous culture system of filamentous algae



Float by bubbles produced by photosynthesis.



Trap SS on filamentous algae



All the floating algal flocks were collected using gill net. We can use for animal food. This work acts as nutrient removal system from water.



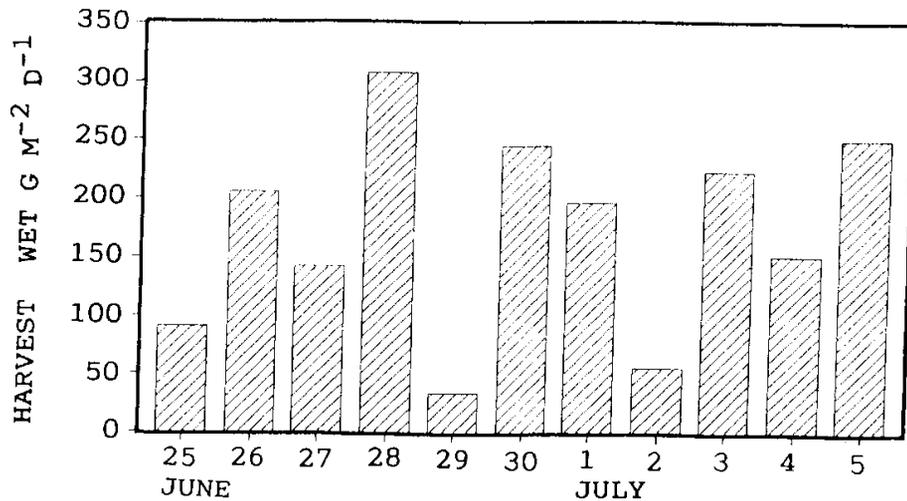


Fig. 3. Daily harvest of the floating clusters of algal mat in a slow sand filter pond.



All the floating algae was harvested every day in a 780m² of filter area during 11 days in summer.

wet weight 173 g/m²/d

dry weight 26 g/m²/d

organic matter 7.81 g/m²/d

Nitrogen 0.37 g/m²/d

Phosphorus 0.032 g/m²/d

Ash 16.5 g/m²/d



Using a roughing filter to eliminate SS from irrigation channel for a continuous culture system of filamentous diatom.



SSF
experiment ,
Open and
covered

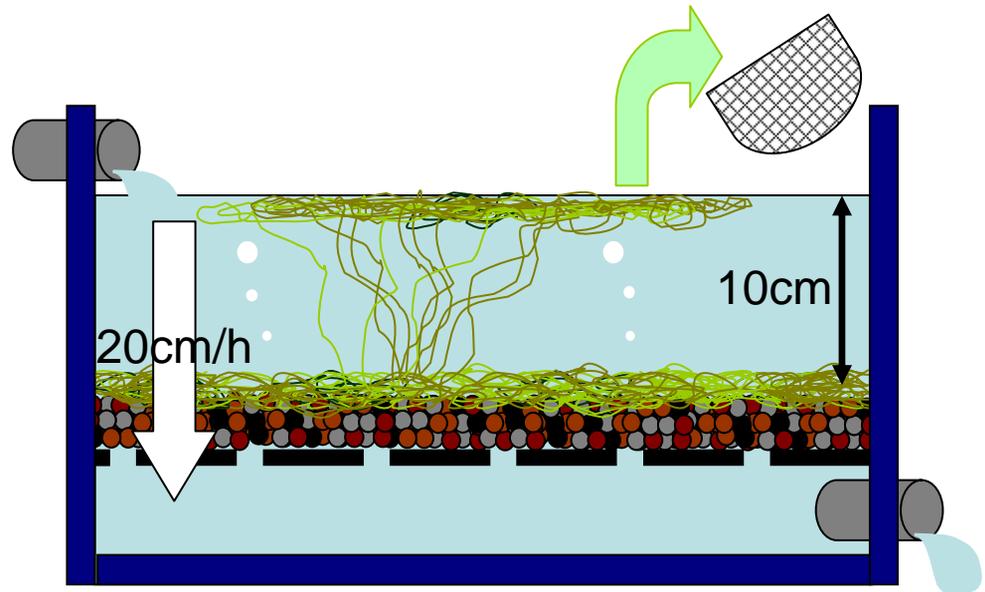
Slow sand filter is down flow current.



Floating algae was harvested using a tea leaf strainer. It is same as a harvest experiment in a real slow sand filter.



However it is easily grazed by insect larvae such as midge larvae. It is hard to keep a better condition of continuous culture system.

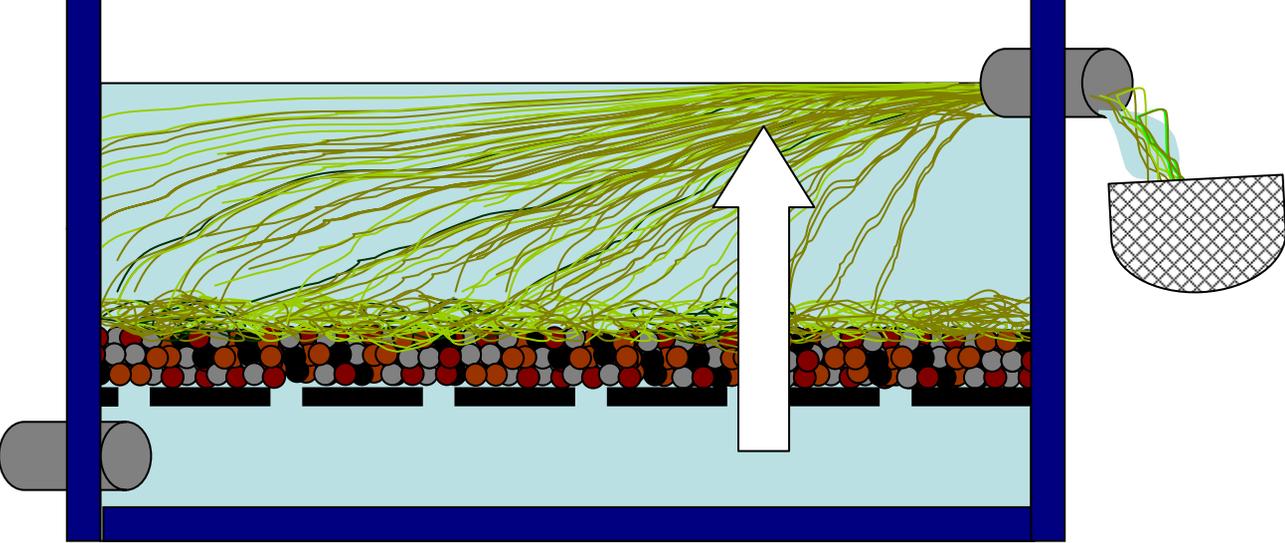
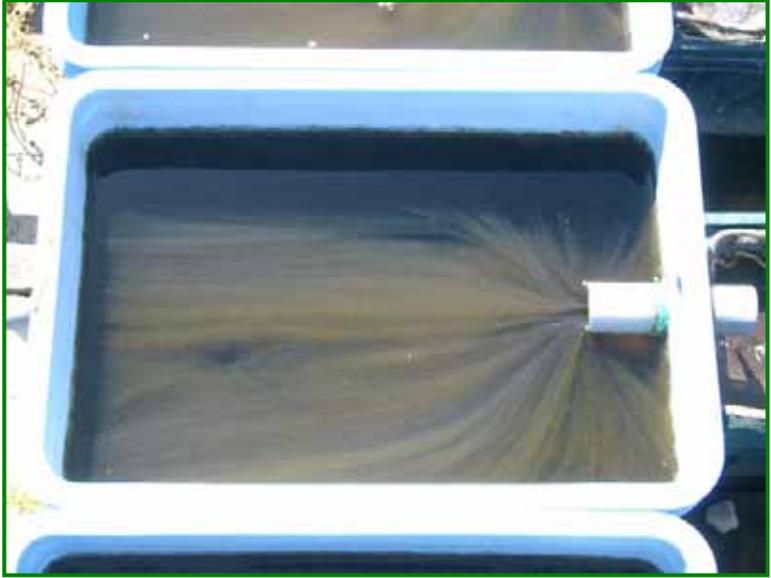


Filamentous diatom and filamentous green algae are found in the seepage pool in a flood plain.



Up-flow continuous culture system like a spring bloom system

Continuous spring out from the bottom and the growth algae flows out constantly.



Automatic and continuous harvesting into metal screen net.



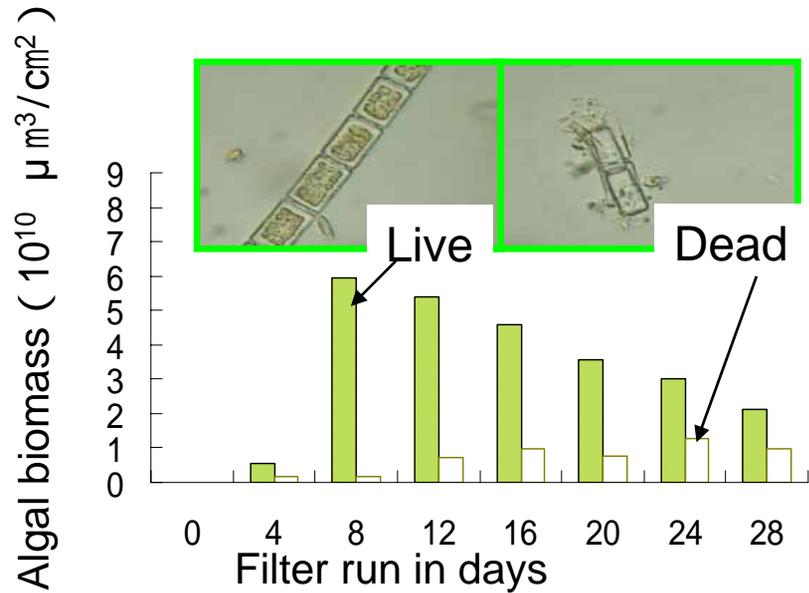
Roughing filter experiment for SSF system and algal culture to reduce suspended matter from the surface water of a stream.



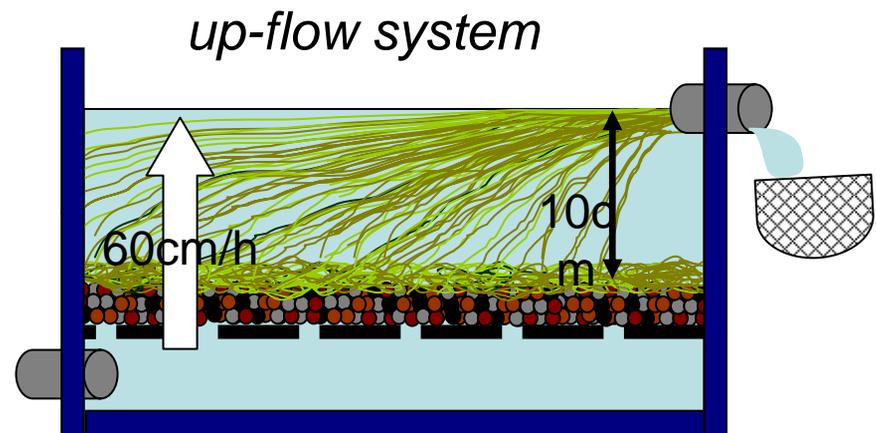
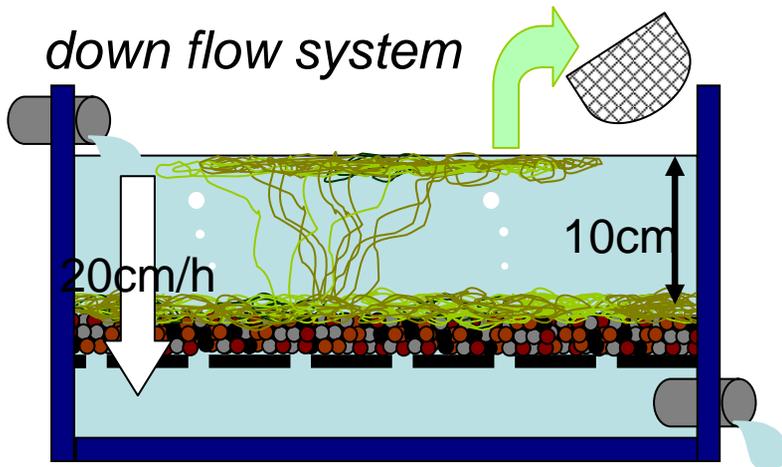
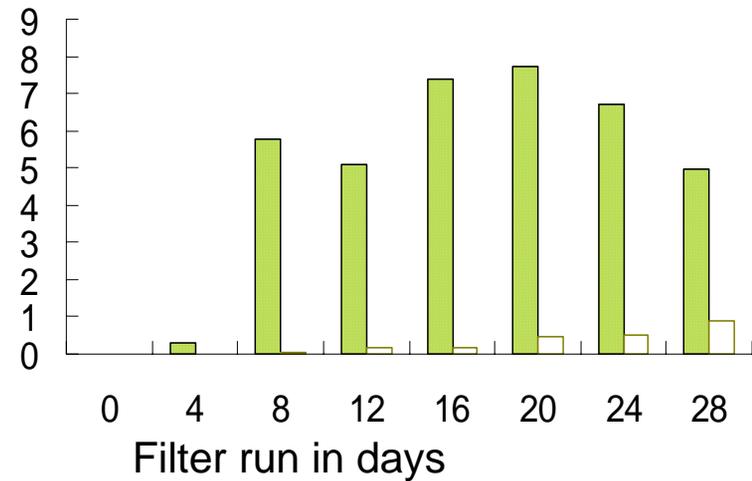
Filamentous algal growth experiment by use of natural stream water.

Algal cell condition during the filter run in a down flow system and in a up-flow system.

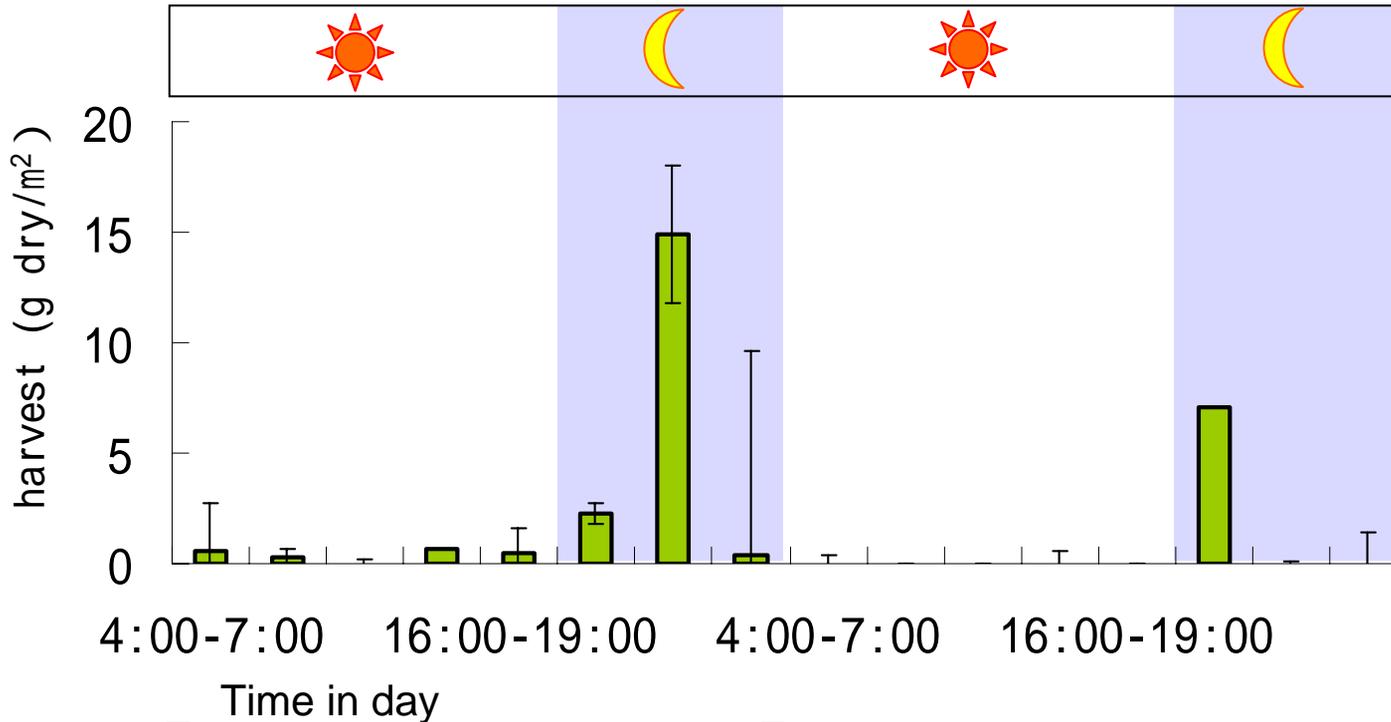
In the case of down flow system, algal cell became bad condition.



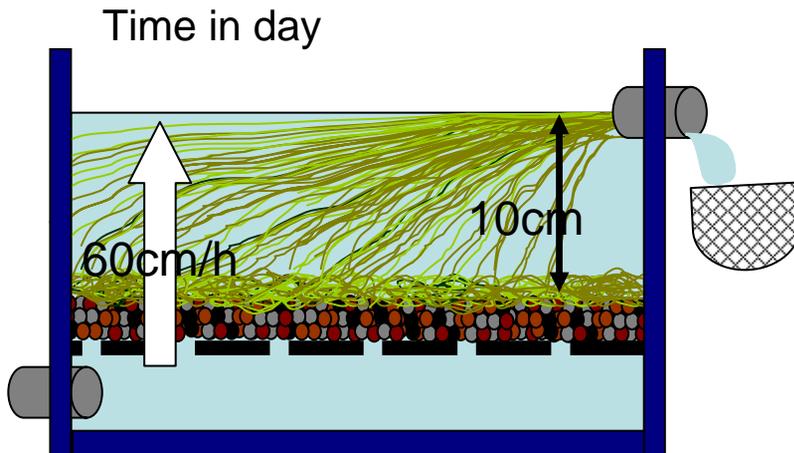
In the case of up-flow system, algal cell kept in healthy condition.



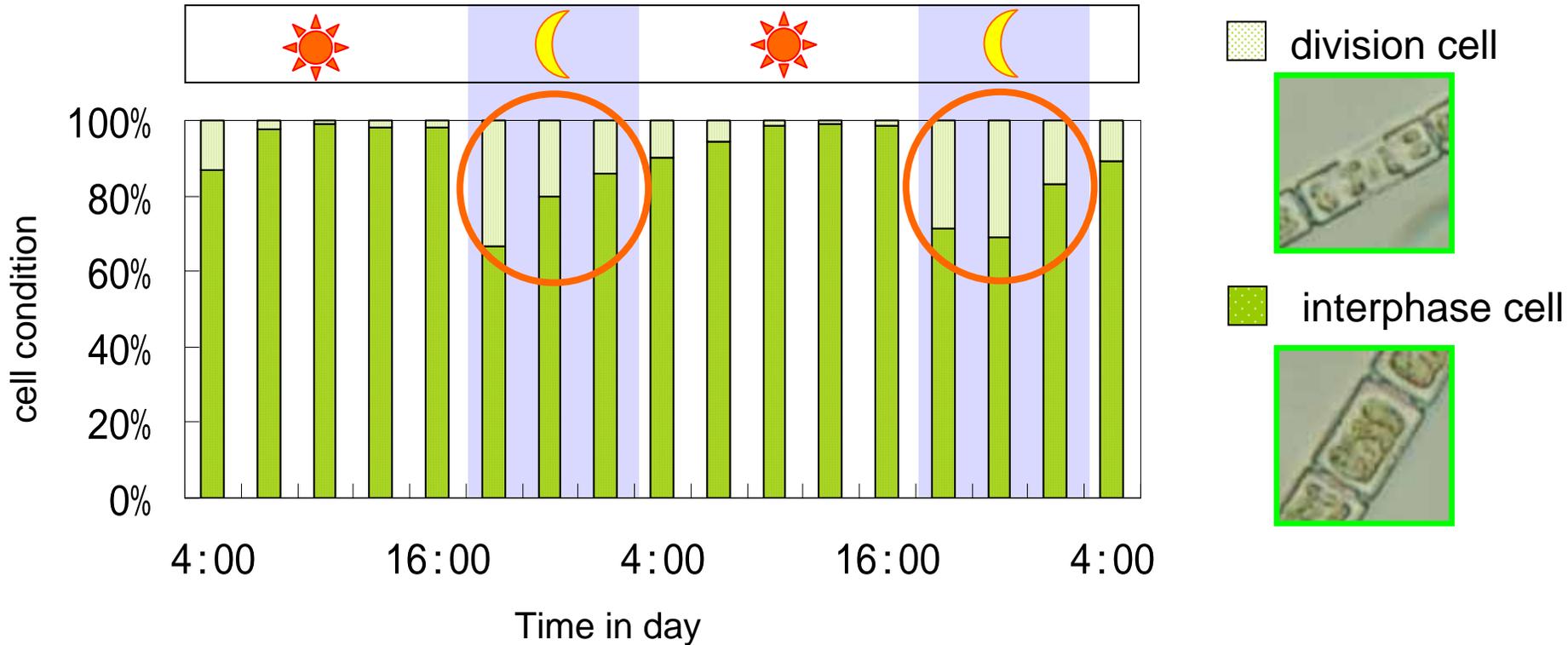
There is a clear peak of the harvest after the sun set using automatic harvest system of up-flow system.



This peak harvest was observed only after the sun set. This means cell division occurs only in the night when photosynthesis can not occurs.



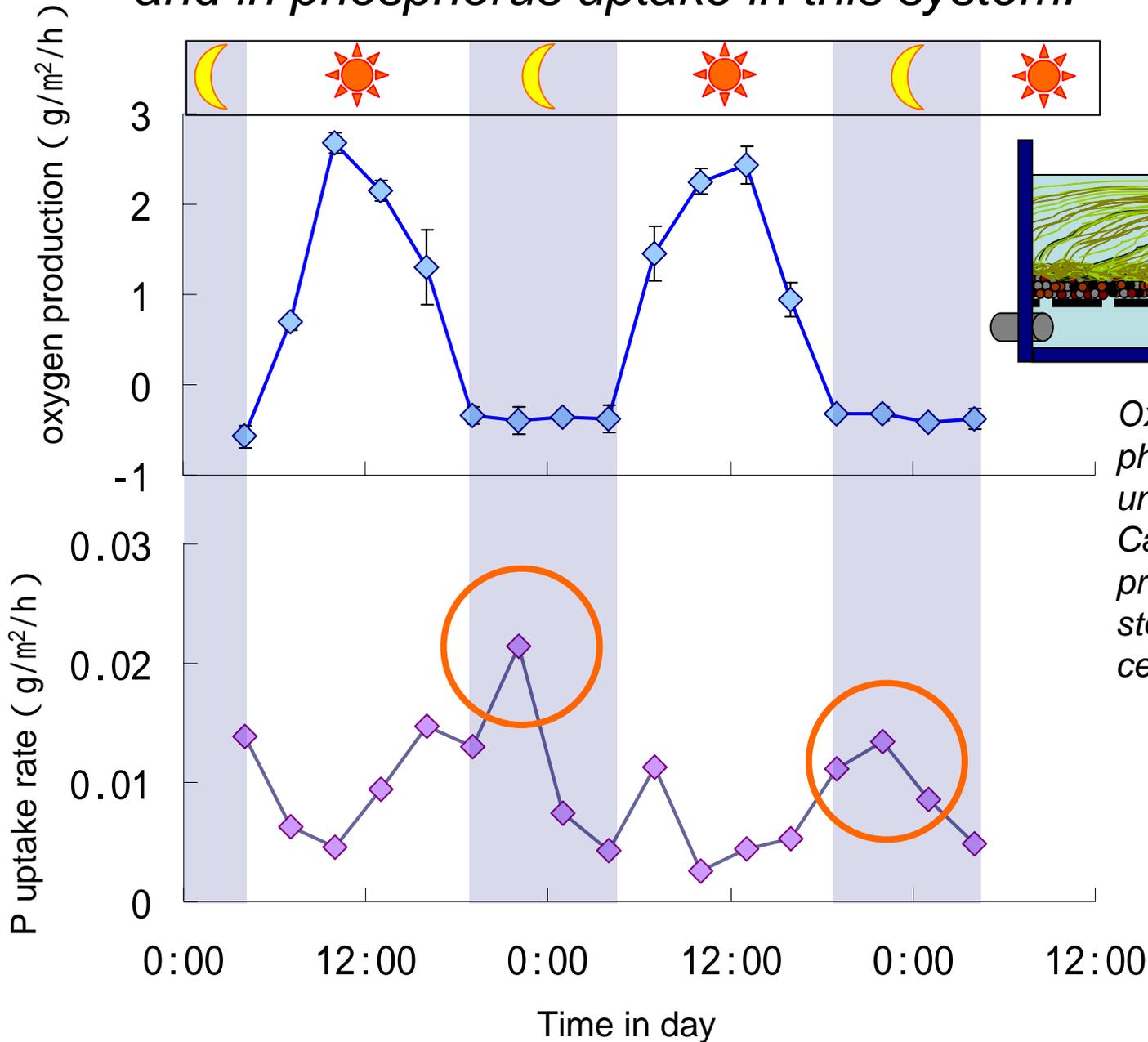
Diurnal change in cell condition of filamentous diatom of Melosira in the up-flow culture system.



Division cell are found in the night (19:00-04:00).

The maximum portion of 33.5 % of division cell was observed at 19:00 on 18th of June.

Diurnal changes in oxygen production by photosynthesis and in phosphorus uptake in this system.

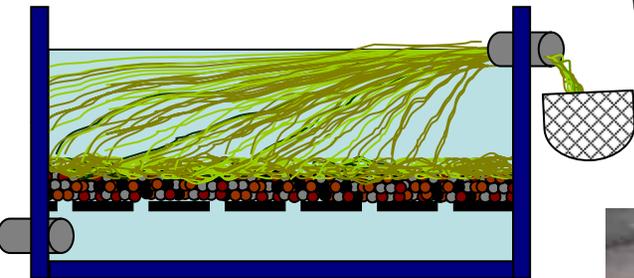


Oxygen production by photosynthesis occurs under the sun shine. Carbohydrate production occurred and stored the energy for cell division.

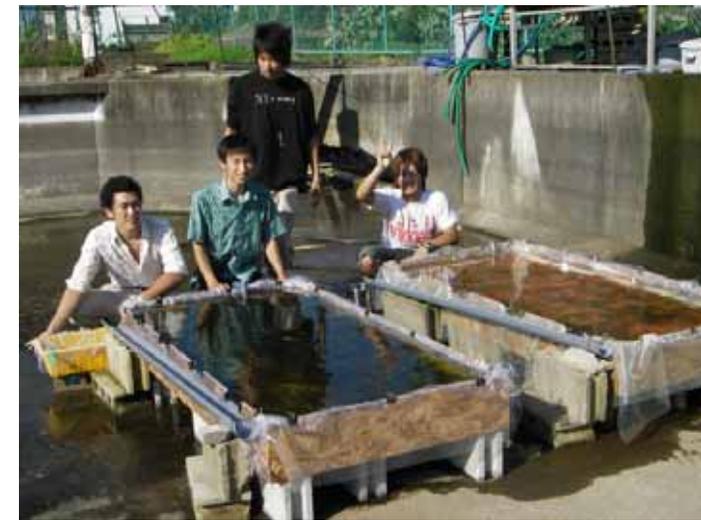
Active phosphorus uptake was done in the night period when photosynthesis did not occur.



By this experiment, up-flow system is better than down flow system. It is enough one time in early morning. The higher harvest of about 30 g/m²/d in dry weight was marked.



Up-flow system and suspension free water is better for the healthy continuous culture system.



This system may useful for animal food production system and nutrient production system.

Conclusion : Useful system of continuous culture of filamentous algae in the Ecological Purification System.

Oxygen Production by Photosynthesis in the day time under the sun shine.



Gives a better condition for hetero-trophs. (Decomposer: bacteria, small animals)

Reduction of Nutrients in Water by Algal Growth in the night time.



Photosynthesis respiration, decomposition



Oligo-trophication (opposite process of eutrophication: shift to less polluted water)

Production of Food and Energy Source for Heterotrophic Organisms

Algae is one of the best food for animals in EPS.