

Impact of bryozoans on the PSII efficiency of Sargassum

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Introduction

Sargassum species such as *s. fluitans* and *s. natans* support epiphytic organisms on its surface, such as diatoms, hydrozoans, and encrusting bryozoans. Evidence previous studies suggests that marine epiphytic organisms have a negative effect on the photosynthetic pathways of the algae they live on (Khan, Du, Khan, Che, and Khurshid 2021; Cancino, Mufioz, Mufioz, and Orellana 1987). Interestingly, some evidence shows that even when epiphytic encrusting bryozoans limit the light reaching red algae, the algae was able to produce more photosynthetic pigments to compensate for the lowered light intensity (Muñoz, Cancino, and Molina 1991).

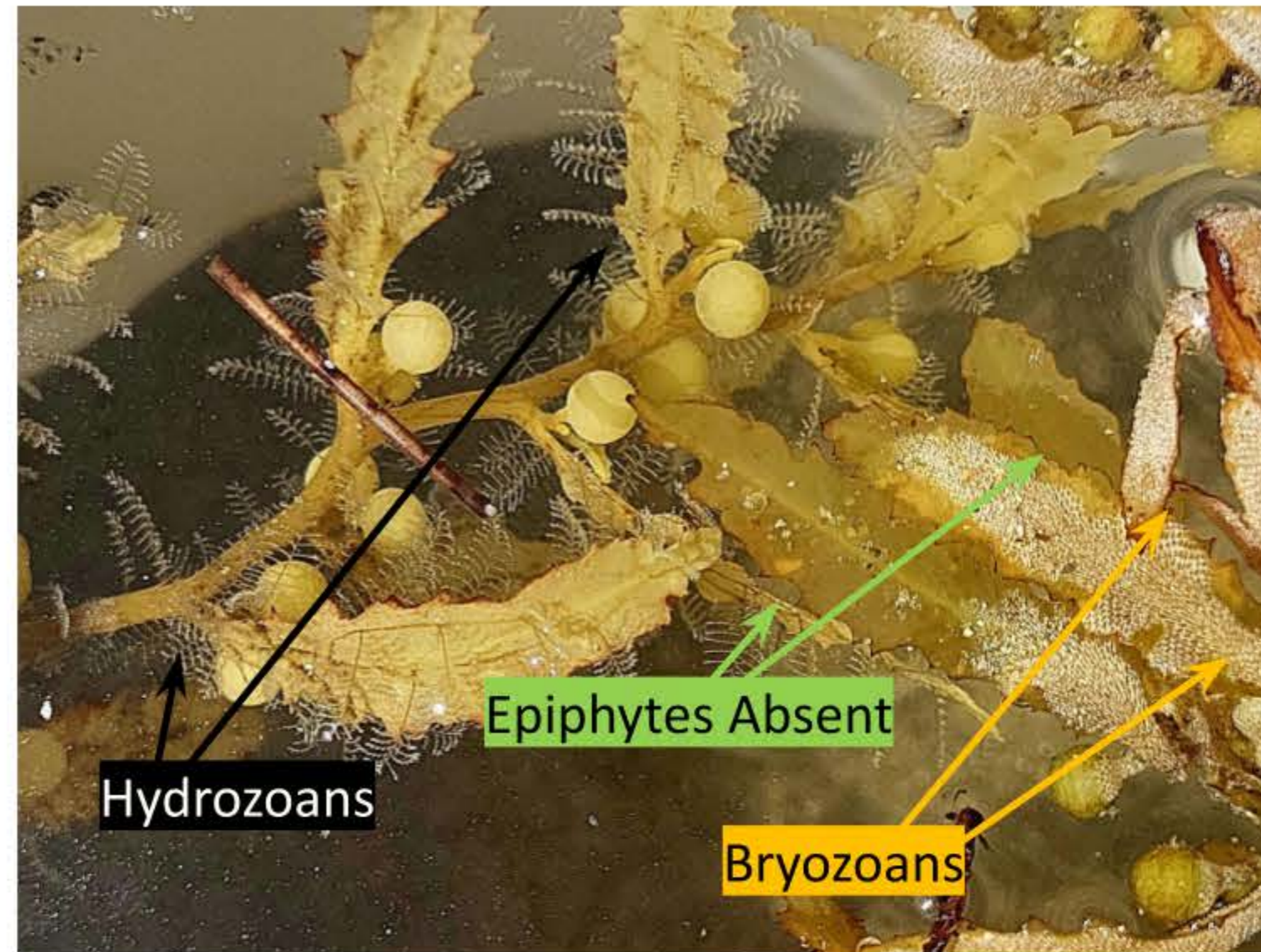
No data is currently available on the effects of epiphytic organisms on the photosynthesis of *S. fluitans* or other *Sargassum* species, but the availability and impact of *Sargassum* on the environment makes it a good candidate for study.

Methods

Data collection shorthand was used to track the specific locations, organisms, and fronds that data was taken from. (See the table to the right).

Specimens were collected no longer than three hours after high-tide, and were kept at 15oC overnight. Within 24 hours of collection, they were taken to the lab and inspected for the presence of bryozoans. (Here, “presence of bryozoans” is defined as encrusting bryozoans being present on both sides of the widest part of the frond.)

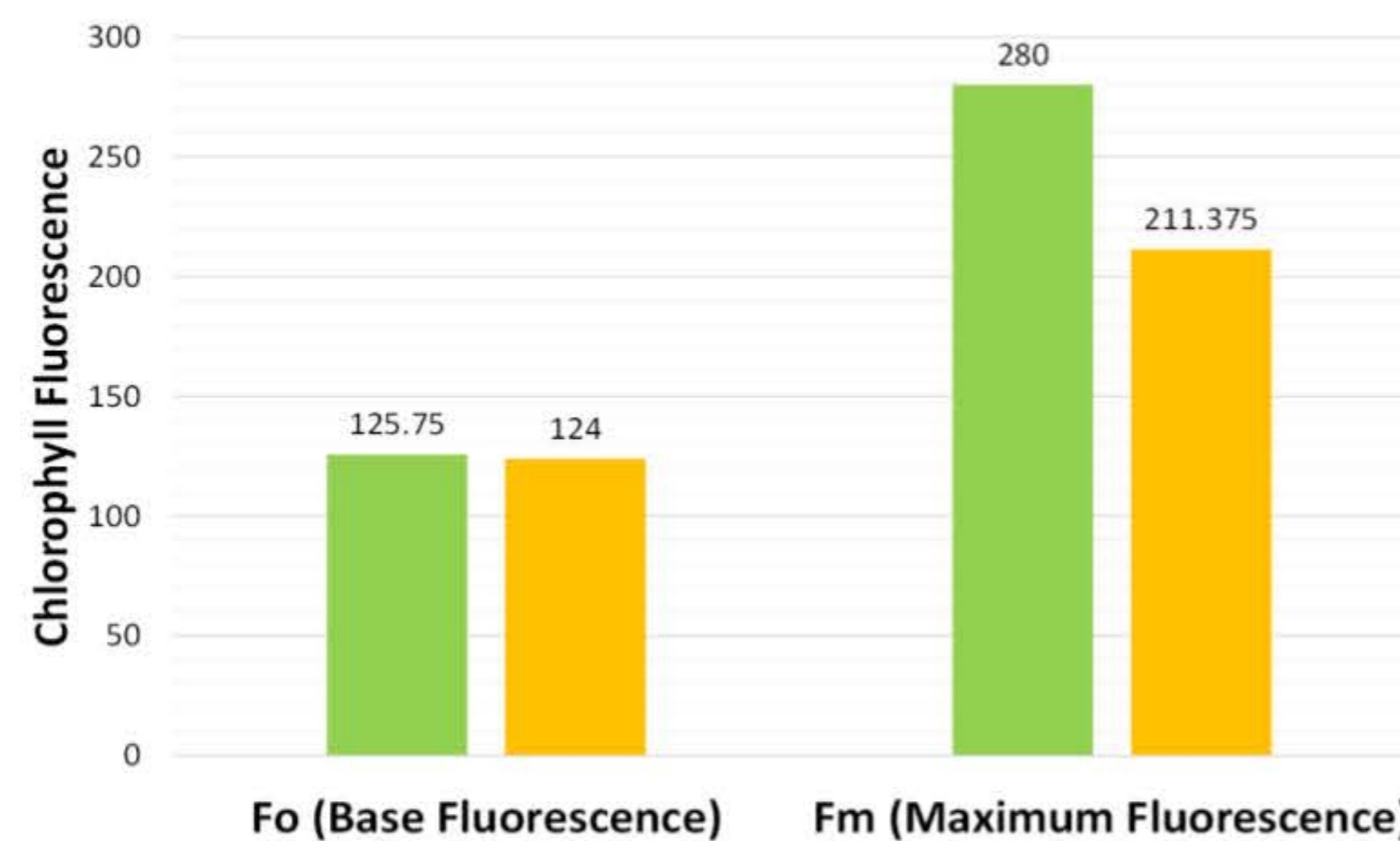
Sargassum fronds were scraped gently with a scalpel regardless of the presence of bryozoans, and then were placed in sectioned ocean water in complete darkness and refrigerated for 20 minutes. Then, a Junior PAM Fluorometer was used to measure their PSII quantum yield and fluorescence. The results were recorded and the specimens were discarded.



Date	Time	Location Name	Collection Data ID Number
01/02/03	04:50	Melbourne Beach	03 01 02 04 . 00
09/08/07	12:30	Sebastian Inlet	07 09 08 13 . 01
08/09/25	02:00	Melbourne Beach	25 08 09 02 . 00

Species & Form	Thallus #	Organism Data ID Number
<i>S. fluitans</i> I	01	03 01 02 04 . 00 _ F1 _ 01
<i>S. natans</i> VIII	02	07 09 08 13 . 01 _ N8 _ 02
<i>S. fluitans</i> I	03	25 08 09 02 . 00 _ F1 _ 03

Frond #	Frond Data ID Number
04	03 01 02 04 . 00 _ F1 _ 01 . 04
05	07 09 08 13 . 01 _ N8 _ 02 . 05
06	25 08 09 02 . 00 _ F1 _ 03 . 06

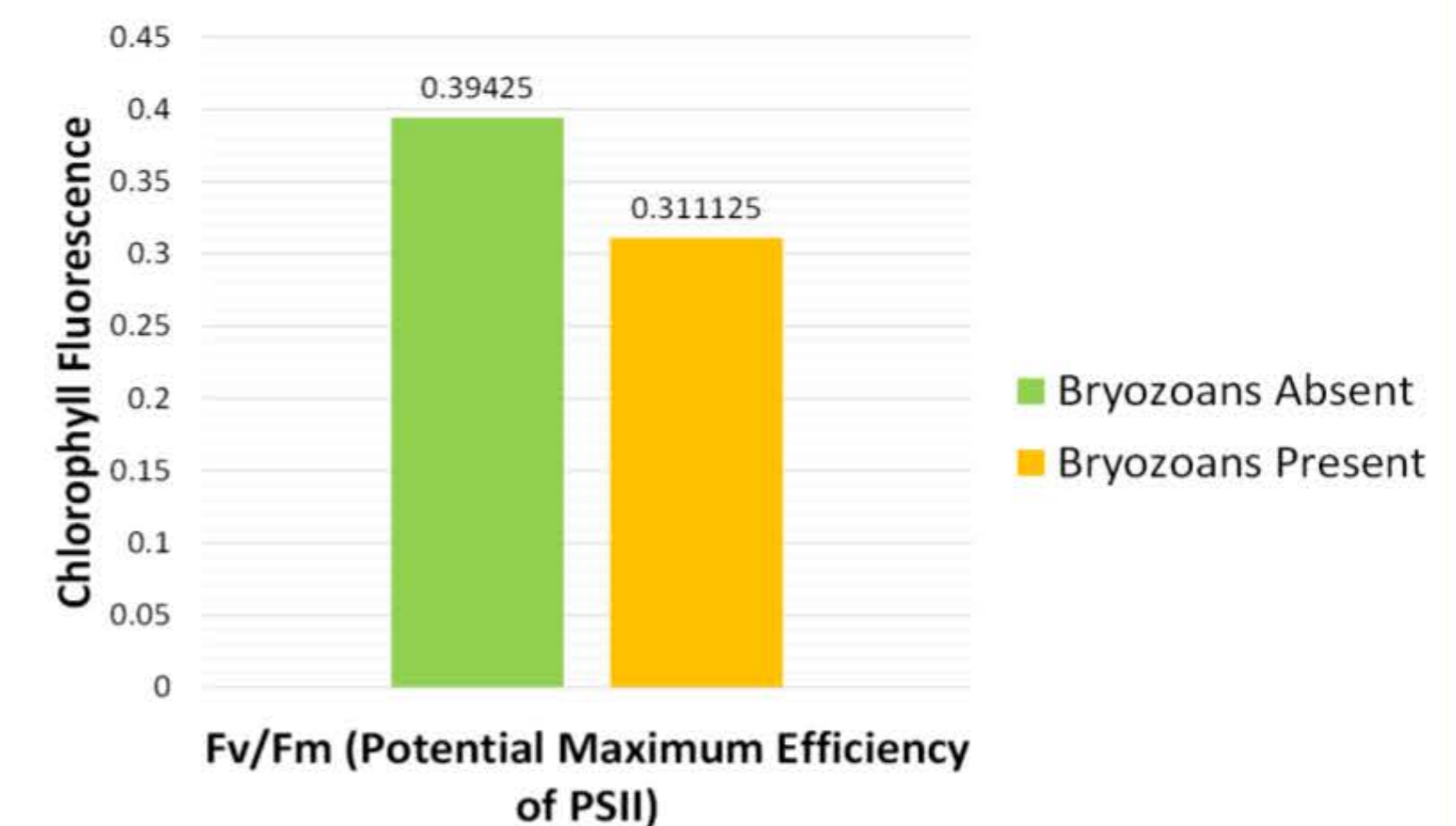


Analysis

Average base fluorescence level (Fo) is extremely similar in specimens with and without bryozoan cover. This is expected; because both groups were dark-acclimated, they should have similar base fluorescence values.

Average maximum fluorescence level (Fm) is different, with the Bryozoans Absent group having a higher fluorescence yield. This directly impacts the Quantum Efficiency of Photosystem II (Fv/Fm), where Fv is the difference between Fo and Fm.

This data shows that *S. fluitans*'s photosynthetic efficiency is likely negatively impacted by the presence of epiphytic organisms such as bryozoans, unlike other algae species. Therefore, the mariculture of *Sargassum* species would likely not benefit from initial stunting growth methods, or by the presence of epiphytic organisms at initial growth stages.



Citations mentioned within introduction:

Cancino, J. M., Mufioz, J., Mufioz, M., Orellana, M. C. (1987). Effects of the bryozoan *Membranipora tuberculata* (Bosc.) on the photosynthesis and growth of *Gelidium rex* Santelices et Abbott. *Journal of Experimental Marine Biology and Ecology*, 113(2), 105-112. [https://doi.org/https://doi.org/10.1016/0022-0981\(87\)90158-4](https://doi.org/https://doi.org/10.1016/0022-0981(87)90158-4)

Khan, Tehsin Ullah & Du, Guoying & Khan, Sohaib & Che, Shuai & Ahmed, A & Khurshid, A. (2021). Epiphytic effects of *Licmophora paradoxa* on pigments of *Pyropia yezoensis*. *Indian Journal of Geo-Marine Sciences*, 779-786.

Muñoz, Jorge & Cancino, Juan & Molina, María. (1991). Effect of Encrusting Bryozoans on the Physiology of Their Algal Substratum. *Journal of The Marine Biological Association of The United Kingdom - J MAR BIOL ASSN UK*. 71. 10.1017/S0025315400053522.

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