

EFFECTS OF CARBON DIOXIDE ON THE GROWTH AND  
MORPHOLOGY OF WAVY-EDGED SWORDPLANT  
(*Apomogenon crispus*)

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LP  
58  
FASM  
3  
2003

FACULTY OF AGRITECHNOLOGY AND FOOD SCIENCE  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

2003

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Effects of carbon dioxide on the growth and morphology of wavy-edged swordplant (*Aponogeton crispus*) / Wong Su Wei.



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Pengarang <b>WONG SU WEI</b>		No. Panggilan <b>LP 55</b>	
Judul <b>EFFECTS OF CARBON DIOXIDE...</b>		<b>FASM 3 2003</b>	
Tarikh	Waktu Pemulangan	Nombor Ahli	Tanda tangan

LP  
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FASM  
3  
2003

EFFECTS OF CARBON DIOXIDE ON THE GROWTH AND MORPHOLOGY OF  
WAVY-EDGED SWORDPLANT (*Aponogeton crispus*)

BY

WONG SU WEI

This project report is submitted in partial fulfillment of  
the requirement of the Degree of  
Bachelor of Agrotechnology (Aquaculture)

Faculty of Agrotechnology and Food Science  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

2003

1100024948

This project report should be cited as:

Wong, S.W. 2003. Effects of carbon dioxide on the growth and morphology of wavy-edged swordplant (*Aponogeton crispus*). Undergraduate thesis, Bachelor of Agotechnology (Aquaculture), Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 45p.

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## ACKNOWLEDGEMENTS

Completing this final year project thesis has been pleasurable, although there were difficulties and unexpected incident occurred during the process of experiment. I would like to dedicate this book to my father, mother, two brothers whose love and loyalty made all the happiness possible and bad things bearable; and for many others who, in one way or another, have made me what I am and therefore this book what it is.

My intellectual debts to an increasing number of people continue to mount. To my mentors, who are also my supervisors, Dr. Abol Munafi and his loving wife, Dr. Siti Aishah Abdullah, who helped me in countless ways apart from supporting me financially and widened my knowledge for the entire research. I should add Mr. Sunny Yeong Yik Sung for providing me great opinions in improving my project and also enlightened me in my thesis. I am grateful to Mr. Lim Eng Huat, director of NanDao Aquarium Sendirian Berhad and his workers for sponsoring *Aponogeton crispus* bulbs. Not to forget many course mates, post-graduate students especially Mr. Bui Minh Tam and Mr. Ng Beng Siang, laboratory assistants of fresh water hatchery, Biology and Biodiversity department, who were always helpful. Special thanks to Mr. Ong Chang Huat, who lent me a great hand whenever I needed his advice and support.

## ABSTRACT

Aquatic plant life including *Aponogeton crispus* depends on CO<sub>2</sub> in the water in order to survive. The availability of light, and of nutrients other than carbon, is probably a more significant abiotic factor limiting net primary productivity of aquatic plants than is the supply of inorganic carbon. However the mechanism by which inorganic carbon is acquired by aquatic plants may affect the need for photons or other nutrients for photosynthesis. This study was conducted to determine the CO<sub>2</sub> concentration that is optimal from the commercial aquarium plant, *Aponogeton crispus*. CO<sub>2</sub> was added at different concentrations (40, 20 and 5 bubbles/minute). Growth rate was determined from height of entire plant. Observations were also done on its effect on leaf morphology. The growth rate of *A. crispus* was highest in saturated CO<sub>2</sub>, 12.3 mg<sup>-1</sup>l. Growth rate declined when concentration of CO<sub>2</sub> was reduced. The fitness of aquatic plants is significantly enhanced by the mechanism of inorganic carbon acquisition whereby aquatic plants increases the CO<sub>2</sub> supply to its system for growth and maintenance processes. *Aponogeton crispus* also had curlier, darker and luster green coloured leaves in water of highest concentration of CO<sub>2</sub>. Contrarily, the sides of leaves were straighter and the leaves were duller in light green colour with lower concentration of CO<sub>2</sub>. This indicated that the plants grew better and healthier in higher concentration of CO<sub>2</sub>.

## ABSTRAK

Tumbuhan akuatik termasuk *Aponogeton crispus* bergantung pada CO<sub>2</sub> dalam air untuk hidup. Sumber cahaya dan nutrisi melainkan karbon, mungkin merupakan faktor abiotik yang lebih ketara dalam menghadkan jumlah produktiviti primer tumbuhan akuatik dibandingkan pembekalan karbon tak organik. Walaubagaimanapun mekanisma karbon tak organik yang diperlukan oleh tumbuhan akuatik boleh mempengaruhi keperluan foton dan nutrisi lain untuk menjalankan fotosintesis. Kajian ini dijalankan untuk menentukan kepekatan CO<sub>2</sub> yang terbaik pada pertumbuhan tumbuhan akuarium komersial, *Aponogeton crispus*. CO<sub>2</sub> ditambahkan pada kepekatan berlainan (40, 20 dan 5 gelembung/minit). Kadar pertumbuhan ditentukan daripada ketinggian seluruh tumbuhan. Kesan CO<sub>2</sub> terhadap morfologi daun juga diperhatikan. Kadar pertumbuhan adalah paling tinggi pada takat tepu CO<sub>2</sub> iaitu 12.3 mg<sup>-1</sup>l. Kadar pertumbuhan menurun apabila kepekatan CO<sub>2</sub> berkurang. Kesihatan tumbuhan akuatik meningkat dengan menjalankankan mekanisma menambah bekalan CO<sub>2</sub> dalam sistem untuk bertumbuh dan proses penyelenggaraan. *Aponogeton crispus* didapati mempunyai daun yang lebih kerinting dan warna hijau yang lebih gelap serta menarik dalam keadaan takat tepu CO<sub>2</sub>. Sebaliknya, tepi daun adalah lebih lurus dan warna hijau daun lebih muda serta tidak menarik dalam kepekatan CO<sub>2</sub> yang lebih rendah. Ini menunjukkan tumbuhan bertumbuh dengan lebih baik dan sihat dalam kepekatan CO<sub>2</sub> yang lebih tinggi.