

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

WONG SU WEI

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KOLEJ UNIVERSITI SAINS & TEKNOLOGI MALAYSIA  
21030 KUALA TERENGGANU

**1100024948**

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HAK MILIK  
**PERPUSTAKAAN KUSTEM**

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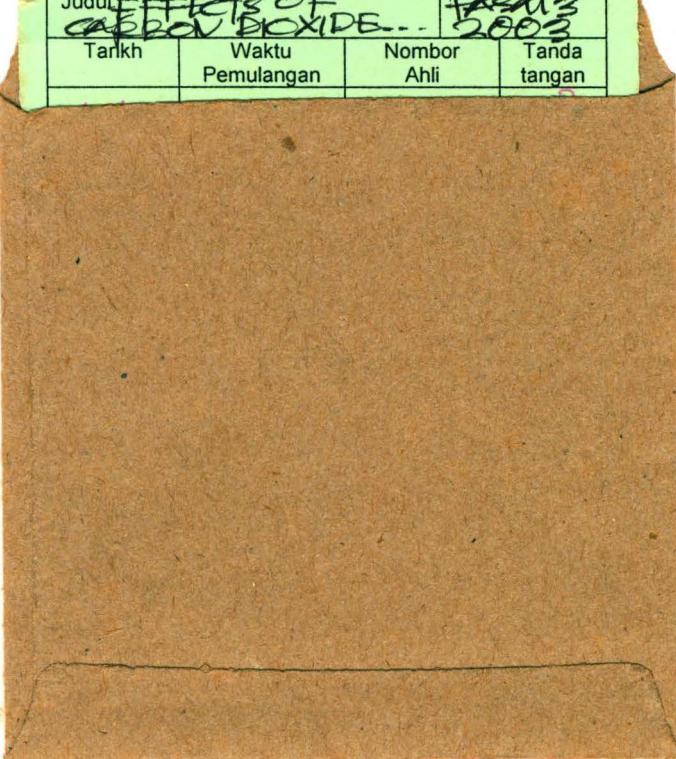
Effects of carbon dioxide on the growth and morphology of  
wavy-edged swordplant (Aponogeton crispus) / Wong Su Wei.



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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  
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## 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 menjalankannya 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.