

THE ROLE OF CYCLIC NUCLEOTIDES IN  
THE MODEL PLANT *ARABIDOPSIS*

MALINNA JUSOH

M. Sc. BY RESEARCH IN PLANT SCIENCES  
TRINITY TERM 2010  
UNIVERSITY OF OXFORD

7719

1100077819

Perpustakaan Sultanah Nur Zahirah  
Universiti Malaysia Terengganu (UMT)



tesis

QP 625 .N89 M3 2010



1100077819

The role of cyclic nucleotides in the model plant arabidopsis /  
Malinna Jusoh.

PERPUSTAKAAN SULTANAH NUR ZAHIRAH  
UNIVERSITI MALAYSIA TERENGGANU (UMT)  
21030 KUALA TERENGGANU

11000778.19


Lihat sebelah

Abstract

The role of cyclic nucleotides in the model plant *Arabidopsis*

Malinna Jusoh

Linacre College

Thesis submitted for the degree of MSc by Research, Trinity Term 2010

Linacre College

University of Oxford

Adenyl cyclases (ACs) catalyse the formation of adenosine 3',5'-cyclic monophosphate (cAMP) from adenosine 5'-triphosphate (ATP). The *Arabidopsis* genome contains two genes, *At3g14460* (AC1) and *At3g14470* (AC2) which have an amino-terminal nucleotide binding domain and sequence homology to invertebrate AC. Expression of AC1 and AC2 complemented the *E. coli* cAMP mutant, *cya*, suggesting that both proteins produce functional cAMP *in vivo*. Gene expression studies using RT-PCR and promoter-GUS staining showed that AC1 is expressed in root tips, inflorescence and anthers, while AC2 is expressed in stem, roots, leaves, flower buds, fruits, and inflorescences. T-DNA insertion mutants of *ac1* and *ac2* showed a delay and a reduction in germination under salt stress. Conversely, overexpression of *ac1* and *ac2* conferred some protection against salt stress. Taken together, I infer that cAMP may have a role in salinity tolerance.

The role of cyclic nucleotides  
in the model plant *Arabidopsis*

Thesis submitted for the degree of  
M.Sc. by Research in Plant Sciences  
Trinity Term 2010

1100057813

## Abstract

### The role of cyclic nucleotides in the model plant *Arabidopsis*

Malinna Jusoh  
Linacre College

Thesis submitted for the degree of MSc by Research, Trinity Term 2010

Adenylyl cyclases (ACs) catalyze the formation of adenosine 3',5'-cyclic monophosphate (cAMP) from adenosine 5'-triphosphate (ATP). The *Arabidopsis* genome contains two genes, At3g14460 (*AC1*) and At3g14470 (*AC2*) which have an amino-terminal nucleotide binding domain and sequence homology to maize AC. Expression of *AC1* and *AC2* complemented the *E.coli* cAMP mutant, *cya* suggesting that both proteins produce functional cAMP *in vivo*. Gene expression studies using RT-PCR and promoter-GUS staining showed that *AC1* is expressed in root tips, inflorescence and anthers, while *AC2* is expressed in stem, roots, cauline leaves, senescent leaves, and inflorescences. T-DNA insertion mutants of *ac1* and *ac2* showed a delay and a reduction in germination under salt stress. Conversely, overexpression of *AC1* and *AC2* conferred some protection against salt stress. Taken together, I infer that cAMP may have a role in salinity tolerance.