

TABLE OF CONTENTS

Abstract	i
Resumen	iii
Resum	v
1. INTRODUCTION	1
1.1. IDENTIFICATION AND DISCOVERY OF ABA	3
1.2. CHEMICAL FEATURES OF ABA	3
1.3. PHYSIOLOGICAL ROLES OF ABA IN THE PLANT	5
1.3.1. ROLE OF ABA UNDER DROUGHT AND SALT STRESS CONDITIONS	5
1.3.2. ROLE OF ABA UNDER BIOTIC STRESS CONDITIONS	7
1.3.3. GROWTH AND DEVELOPMENT	8
1.4. REGULATION OF ABA LEVELS IN THE PLANT IN RELATION TO ITS PHYSIOLOGICAL ROLES: METABOLISM, STORAGE AND TRANSPORT	9
1.5. ABA SIGNALLING CASCADE	15
1.5.1. TYPE 2C PROTEIN PHOSPHATASES (PP2C): NEGATIVE REGULATORS IN THE ABA SIGNALLING CASCADE	15
1.5.2. PROTEIN KINASES INVOLVED IN THE ABA SIGNALLING CASCADE	21
1.5.2.1. Ca ²⁺ -INDEPENDENT KINASES	22
1.5.2.1.1. SNF1-RELATED PROTEIN 2 FAMILY (SnRK2s)	22
1.5.2.2. Ca ²⁺ -REGULATED KINASES	26
1.5.2.2.1. CALCIUM DEPENDENT KINASES (CDPKs/CPKs)	26
1.5.2.2.2. SnRK3s /CIPKs	27
1.5.3. TRANSCRIPTION FACTORS INVOLVED IN ABA SIGNALLING	29
1.5.3.1. ABI5/AREB/ABFs bZIP-TYPE TRANSCRIPTION FACTORS	30
1.5.4. REGULATION OF TARGET PROTEINS INVOLVED IN STOMATA CLOSURE	33
1.5.5. HORMONE SENSING AND PERCEPTION	38
1.5.5.1. ABA RECEPTORS IDENTIFIED UP TO NOW	38
1.5.6. ELUCIDATION OF THE CORE ELEMENTS AND RECONSTITUTION OF THE ABA SIGNALLING PATHWAY	45
1.5.7. SECOND MESSENGERS IN ABA SIGNALLING	49
1.5.8. ARCHITECTURE AND FUNCTION OF THE PYR/PYL/RCAR RECEPTORS	53

1.5.9. ARCHITECTURE OF TERNARY COMPLEX: INSIGHTS OF THE ABA-INDUCED INHIBITION MECHANISM OF PP2Cs	57
1.5.9.1.A MOLECULAR EXPLANATION FOR <i>abi1</i> ^{G180D} , <i>abi2</i> ^{G168D} and <i>hab1</i> ^{G246D} MUTANTS	62
2. OBJECTIVES	65
3. RESULTS: CHAPTER 1	69
Modulation of drought resistance by abscisic acid receptor PYL5 through inhibition of clade A PP2Cs	
4. RESULTS: CHAPTER 2	89
The abscisic acid receptor PYR1 in complex with abscisic acid	
5. APPENDIX RESULTS: CHAPTER 2	107
6. RESULTS: CHAPTER 3	119
A thermodynamic switch modulates the abscisic acid receptor sensitivity	
7. RESULTS: CHAPTER 4	145
The ABA-PYR/PYL/RCAR-PP2C signalling pathway is conserved in cultivated plants	
8. GENERAL DISCUSSION	169
8.1. HORMONE SENSING AND PERCEPTION: a critical overview on the ABA receptors	171
8.2. ARCHITECTURE AND FUNCTION OF THE PYR/PYL/RCAR RECEPTORS	180
8.3. BIOTECHNOLOGICAL APPLICATION	192
9. CONCLUSIONS	195
10. REFERENCES	199
11. APPENDIX 1	221