

Table of contents

Abstract	1
Resumen	4
Resum	7
Abbreviations	10
1. General introduction	14
1.1. Intercellular adhesion and cell separation are key processes for plant growth and development.....	14
1.1.1. Plant cells are attached to their neighbors by a shared cell wall interface, the middle lamella.....	15
1.1.2. Molecular determinants associated with cell adhesion.....	16
1.2. Loss of intercellular adhesion leads to cell separation.....	17
1.3. Abscission is a cell separation process.....	18
1.3.1. Abscission is regulated by developmental and environmental cues.....	18
1.3.1.1. Physiological factors.....	18
1.3.1.2. Environmental factors.....	18
1.3.1.3. Hormonal factors.....	19
1.3.2. The abscission pathway involves four sequential stages.....	23
1.3.2.1. Differentiation of the abscission zone.....	24
1.3.2.2. Acquisition of competence to respond to abscission-promoting cues.....	26
1.3.2.3. Activation of the abscission process within the abscission zone and organ detachment.....	27
1.3.2.4. Differentiation of a protective layer.....	30
1.4. The Arabidopsis abscission regulatory module INFLORESCENCE DEFICIENT IN ABSCISSION / HAESA-like receptor kinases.....	32
2. Aims and Design of the Present Study	39
3. Materials and methods	42
4. Identification and molecular analysis of INFLORESCENCE DEFICIENT IN ABSCISSION (IDA)-like genes and HAESA (HAE)-like receptor kinases in Solanaceae species of agronomic importance	47
4.1. The <i>IDA</i> -like gene family in the Solanaceae.....	48
4.2. Phylogenetic relationship among <i>IDA</i> -like prepropeptides in Solanaceae.....	52

4.3. <i>Cis</i> -acting regulatory elements in the promoter regions of the <i>N. benthamiana</i> <i>IDA</i> -like family.....	54
4.4. The <i>HAE</i> -like gene family in the Solanaceae.....	55
4.5. Phylogenetic relationship among <i>HAE</i> -like protein kinases in Solanaceae.....	57
4.6. Amino acid residues involved in the interaction between <i>IDA</i> mature peptides and <i>HAESA</i> -like receptors.....	59
4.7. Expression patterns of <i>IDA</i> -like and <i>HAE</i> -like genes in <i>Nicotiana benthamiana</i> during growth and abscission.....	62
4.8. Expression patterns of <i>IDA</i> -like genes in <i>Nicotiana benthamiana</i> during water stress.....	68
4.9. Conclusions.....	70
5. Silencing and overexpression of INFLORESCENCE DEFICIENT IN ABSCISSION and HAESA receptor kinase in flowers of <i>Nicotiana benthamiana</i>: effects on corolla abscission.....	72
5.1. Silencing and overexpression of <i>IDA</i> -like and <i>HAE</i> -like genes using a viral vector based on <i>Citrus leaf blotch virus</i>	73
5.2. The inoculation of <i>clbv3'</i> - <i>NbenIDA</i> and <i>clbv3'</i> - <i>NbenHAE</i> constructs arrests corolla abscission.....	79
5.3. Anatomy of the corolla tube base in flowers of plants inoculated with the control <i>clbv3'</i> vector and the <i>clbv3'</i> - <i>NbenIDA</i> construct.....	82
5.4. Knockdown of target genes at the base of the corolla tube through inoculation with the <i>clbv3'</i> - <i>NbenIDA</i> and <i>clbv3'</i> - <i>NbenHAE</i> constructs.....	84
5.5. Overexpression of <i>NbenIDA1A</i> decreases plant growth and accelerates corolla senescence and abscission.....	87
5.6. Conclusions.....	92
6. General discussion.....	94
7. Conclusions.....	99
8. Literature cited.....	102
9. Supplemental data.....	120