

Contents

<i>Preface</i>	v
<i>Acknowledgements</i>	vii
<i>List of special topic boxes</i>	xii
<i>List of tables</i>	xiii
<i>Abbreviations</i>	xiii
1 The role of the cell wall in the life of the plant	
1.1 Summary	1
Further reading	3
2 Cell-wall structure and the skeletal functions of the wall	
2.1 The layered structure of the wall	4
2.2 The microfibrillar phase: cellulose	7
2.3 The matrix phase: introduction	15
2.4 Extraction and classification of matrix polysaccharides	19
2.5 Pectic polysaccharides	22
2.6 Hemicelluloses	27
2.7 Proteins and glycoproteins	32
2.8 Lignin and other phenolic compounds	34
2.9 Cross-links between wall polymers	36
2.10 The cell wall as a set of interlinked networks	41
2.11 Chemical and physical properties of the whole cell wall	44
2.12 Mechanical strength as a specialized property of certain cells	48
2.13 Summary	57
Further reading	57
3 Cell-wall formation	
3.1 Stages of wall formation	58
3.2 Biochemical pathways of wall polysaccharide formation	60
3.3 Biochemical pathways of wall protein formation	69
3.4 Biochemical pathways of lignin formation	69
3.5 Sites of formation of cell-wall polymers	70
3.6 Control of wall formation	82

CONTENTS

3.7 Summary	87
Further reading	87
4 The cell wall and control of cell growth	
4.1 Interaction between wall properties and turgor in growth control	89
4.2 The physical properties of the wall under tension	91
4.3 Properties of <i>in vivo</i> wall extension	97
4.4 Control of wall extensibility	101
4.5 Wall turnover	112
4.6 Summary	113
Further reading	113
5 The cell wall and intercellular transport	
5.1 Symplastic and apoplastic transport	114
5.2 Adaptations for impermeability	115
5.3 Special adaptations for transport	118
5.4 Summary	135
Further reading	135
6 The cell wall and interactions with other organisms	
6.1 Pathogens and potential pathogens	137
6.2 Predators	150
6.3 Nodulation and nitrogen fixation	150
6.4 Graft unions	153
6.5 Summary	153
Further reading	153
7 The cell wall and reproduction	
7.1 Pollen mother cells	155
7.2 Pollen-grain walls	157
7.3 Pollen-stigma interactions	159
7.4 The pollen tube	162
7.5 Cell-wall food reserves in seeds	162
7.6 Summary	167
Further reading	167
8 Cell-wall degradation	
8.1 Mobilization of food reserves in seeds	169
8.2 Abscission	170
8.3 Fruit ripening	172
8.4 Degradation by microorganisms	174

CONTENTS

8.5 Technological applications	175
8.6 Summary	178
1 Other reading	179
9 Outstanding problems for future research	
9.1 Summary	181
<i>Glossary</i>	182
<i>References</i>	187
<i>Index</i>	188