

Contents

Introduction	1
Part I General Considerations on Halophytes	
Halophyte Definitions and Classifications	5
References	22
Halophytes and Their Habitats: Finding a Place Within Plant	
Ecological Classes	27
References	31
General Morphological and Anatomical Adaptations in Halophytes . . .	33
Succulence	33
Mucilage Cells	34
Cell Sap	34
The Palisade Tissue	34
The Intercellular Spaces	34
Wax	35
Hair Coating	35
Coriaceous and Glossy Leaves	35
The Stomata	35
Tracheids	36
Lignification	36
Idioblasts	36
Salt-Secreting Structures	36
Kranz Anatomy Structures	37
References	37
Halophytes and Salt Stress: Histo-Anatomical Features in	
Halophytes—Formative Effect, Adaptation or a Simple Response	
to an Intensely Abiotic Factor?	39
References	41

**Part II An Integrative Anatomical Study of Halophytes:
Anatomical Structure in Different Family Species**

Material and Methods	47
References	50
Caryophyllaceae	53
<i>Spergularia media</i> (L.) C. Presl	53
References	64
Chenopodiaceae	65
<i>Arthrocnemum macrostachyum</i> (Moris.) Moris in Moris & Delponte	65
<i>Atriplex glauca</i> L.	69
<i>Atriplex halimus</i> L.	76
<i>Atriplex littoralis</i> L.	78
<i>Atriplex prostrata</i> Boucher ex DC	92
<i>Atriplex tatarica</i> L.	107
<i>Bassia hirsuta</i> (L.) Asch.	118
<i>Bassia hyssopifolia</i> (Pall.) Kuntze	130
<i>Bassia sedoides</i> (Pall.) Asch.	132
<i>Camphorosma annua</i> Pall.	138
<i>Chenopodium album</i> L.	150
<i>Halimione portulacoides</i> (L.) Aellen in Verh.	155
<i>Halimione verrucifera</i> (M. Bieb.) Aellen	158
<i>Halocnemum strobilaceum</i> (Pall.) M. Bieb.	175
<i>Petrosimonia oppositifolia</i> (Pall.) Litv.	177
<i>Petrosimonia triandra</i> (Pall.) Simonk.	187
<i>Salicornia europaea</i> L.	198
<i>Salicornia ramosissima</i> Woods	211
<i>Salsola kali</i> L.	216
<i>Salsola oppositifolia</i> Desf.	222
<i>Sarcocornia fruticosa</i> (L.) A. J. Scott	226
<i>Suaeda maritima</i> (L.) Dumort.	232
<i>Suaeda spicata</i> (Willd.) Moq.	238
<i>Suaeda splendens</i> (Pourr.) Gren&Godr.	243
<i>Suaeda vera</i> (Forsk.) ex J. F. Gmel.	247
References	249
Polygonaceae	257
<i>Polygonum equisetiforme</i> Sm.	257
<i>Polygonum patulum</i> M. Bieb.	259
Plumbaginaceae	269
<i>Limonium furfuraceum</i> (Lag.) Kuntze Revis.	269
<i>Limonium girardianum</i> (Guss.) Fourr.	275

<i>Limonium narborensense</i> Mill.	282
<i>Limonium parvibracteatum</i> × <i>Limonium santapolense</i>	286
References	296
Fabaceae	297
<i>Lotus tenuis</i> Waldst. et Kit. ex Willd.	297
<i>Trifolium fragiferum</i> L.	302
Leaf	309
Reference	311
Lythraceae	313
<i>Lythrum virgatum</i> L.	313
Apiaceae	319
<i>Crithmum maritimum</i> L.	319
Reference	325
Frankeniaceae	327
<i>Frankenia laevis</i> L.	327
References	329
Brassicaceae	331
<i>Lepidium cartilagineum</i> (J. C. Mayer) Thell. ssp. <i>crassifolium</i> (Waldst. & Kit.) Thell.	331
<i>Lepidium latifolium</i> L.	340
<i>Lepidium perfoliatum</i> L.	350
References	359
Primulaceae	361
<i>Glaux maritima</i> L.	361
References	367
Plantaginaceae	369
<i>Plantago coronopus</i> L.	369
<i>Plantago crassifolia</i> Forssk.	373
<i>Plantago schwarzenbergiana</i> Schur	378
<i>Plantago tenuiflora</i> Waldst. et Kit.	390
References	394
Asteraceae	395
<i>Artemisia santonica</i> L.	395
<i>Aster tripolium</i> L. ssp. <i>pannonicus</i> (Jacq.) Soo	407
<i>Inula crithmoides</i> (L.) Dumort	420
<i>Lactuca saligna</i> L.	428
<i>Scorzonera cana</i> (C.A. Mey.) O. Hoffm.	440
References	452

Juncaginaceae	455
<i>Triglochin maritima</i> L.	455
Cymodoceaceae	461
<i>Cymodocea nodosa</i> (Ucria) Asch.	461
Iridaceae	469
<i>Iris halophila</i> Pall.	469
References	479
Juncaceae	481
<i>Juncus gerardi</i> Loisel.	481
References	494
Cyperaceae	495
<i>Bolboschoenus maritimus</i> (L.) Palla ssp. <i>compactus</i> (Hoffm.) Drobow	495
<i>Carex distans</i> L.	500
<i>Carex vulpina</i> L.	508
References	513
Poaceae	517
<i>Aeluropus littoralis</i> (Gouan) Parl.	517
<i>Agrostis stolonifera</i> L. ssp. <i>stolonifera</i>	519
<i>Alopecurus arundinaceus</i> Poir.	524
<i>Puccinellia distans</i> (L.) Parl. ssp. <i>limosa</i> (Schur) Jáv.	530
<i>Sporobolus pungens</i> (Schreber) Kunth	534
References	541
Part III Conclusions	
An Overall View on Halophytes Adaptations and Their Ecological Significance	545