

Contents

Section I Cells and Tissues 1

Introduction 3

Chapter 1 Tissues 5

Chapter 2 Parenchyma 8

Chapter 3 Collenchyma 10

Chapter 4 Sclerenchyma, a Typical Contributor to
Weediness 12

Section II Meristematic, Secretory, Storage and Boundary Structures 17

Chapter 5 Meristems 19

Chapter 6 Secretory Structures 24

Chapter 7 External Secretory Structures 26

Chapter 8 Internal Secretory Structures 30

Chapter 9 Stored Compounds 35

Chapter 10 Epidermis 37

Chapter 11 Stomata 40

Chapter 12 Non-glandular Trichomes and Papillae 42

Section III Vascular Elements and Pith 47

Chapter 13 Vascular Bundles 49

Chapter 14 Xylem 52

Chapter 15 Pits 58

Chapter 16 Phloem 60

Chapter 17 Pith 64

Section IV Stem, Root and Growth 67

Chapter 18 Stem 69

Chapter 19 Dicot Stem – Cortex 71

Chapter 20 Dicot Stem – Patterns of Vascular Tissues 74

Chapter 21 Vascular Bundles and Leaf Traces in Dicots 78

Chapter 22 Monocot Stem 82

Chapter 23 Horsetail and Bracken Stem 88

Chapter 24 Root Morphology 92

Chapter 25 Root Histology 97

Chapter 26 Root Tip 99

Chapter 27 Xylem Patterns 102

Chapter 28 Endodermis and Pericycle 109

Chapter 29 Rhizodermis, Exodermis and Cortex 114

Chapter 30 Root Genetics 116

Chapter 31 Primary and Secondary Growth 117

Chapter 32 Anomalous Secondary Growth 126

Section V Complex Tissues and Organs 129

Chapter 33 Leaf 131

Chapter 34 Flower 142

Chapter 35 Androecium 154

Chapter 36 Gynoecium 159

Chapter 37 Genetics of Flower Formation 169

Chapter 38 Fruit 170

Chapter 39 Carpels, Pericarp and Various Fruit
Forms 173

Chapter 40 Genetics of Fruit Development 184

Chapter 41 Seed 185

Chapter 42 Genetics of Seed Development 190

Chapter 43 Secondary Reproduction
Characteristics 191

Chapter 44 Flower Modifications in Weeds 192

Chapter 45 Seedling and Embryo 196

Section VI Vegetative Propagation 203

Chapter 46 Vegetative Weed Reproduction 205

Chapter 47 Rhizomes 206

Chapter 48 Tubers and Corms 211

Chapter 49 Stolons and Runners 217

Chapter 50 Roots with Adventitious Buds 219

Chapter 51 Bulbs 222

Section VII Weediness 225

Chapter 52 Indicators of Weediness 227



Section VIII

Short Monographs 233

Chapter 53 Introduction to Monographs 235

Chapter 54 Weed Anatomy Monographs 237

Monograph 1: *Abutilon theophrasti* Medicus 237

Monograph 2: *Alopecurus myosuroides* Huds. and
Alopecurus japonicus Steudel 241

Monograph 3: *Amaranthus retroflexus* L. and
Amaranthus palmeri S. Wats. 248

Monograph 4: *Ambrosia artemisiifolia* L. 259

Monograph 5: *Apera spica-venti* (L.) P. Beauv. 266

Monograph 6: *Avena fatua* L. and *Avena sterilis* L. 268

Monograph 7: *Bidens pilosa* L. and
Bidens tripartita L. 272

Monograph 8: *Bromus secalinus* L., *Bromus sterilis* L.
and *Bromus tectorum* L. 276

Monograph 9: *Calystegia sepium* (L.) R. Br. and
Convolvulus arvensis L. 279

Monograph 10: *Chenopodium album* L. 282

Monograph 11: *Cirsium arvense* (L.) Scop. 293

Monograph 12: *Conyza canadensis* (L.) Cronq. and
Conyza bonariensis (L.) Cronq. 298

Monograph 13: *Cynodon dactylon* (L.) Pers. 304

Monograph 14: *Cyperus esculentus* L., *Cyperus iria* L.,
Cyperus rotundus L. and *Cyperus*
serotinus Rottb. 311

Monograph 15: *Digitaria sanguinalis* L. 325

Monograph 16: *Echinochloa colonum* (L.) Link and
Echinochloa crus-galli (L.) Beauv. 333

Monograph 17: *Eleusine indica* (L.) Link 342

Monograph 18: *Elytrigia repens* (L.) Nevski 348

Monograph 19: *Fallopia convolvulus* (L.) Löve, *Fallopia*
japonica (Houtt.) Ronse Decraene,
Fallopia sachalinensis (F. Schmidt)
Ronse Decraene and *Fallopia*
baldschuanica (Regel) Holub 357

Monograph 20: *Galium aparine* L. 370

Monograph 21: *Impatiens glandulifera* Royle 375

Monograph 22: *Lolium multiflorum* Lam., *Lolium*
perenne L. and *Lolium rigidum*
Gaudin 386

Monograph 23: *Myosotis arvensis* (L.) Hill and
Myosotis palustris (L.) Nath. 394

Monograph 24: *Paspalum dilatatum* Poir. 400

Monograph 25: *Phalaris minor* Retz. and *Phalaris*
paradoxa L. 410

Monograph 26: *Poa annua* L. 416

Monograph 27: *Polygonum amphibium* L., *Polygonum*
aviculare L. and *Polygonum*
lapathifolium L. 422

Monograph 28: *Rottboellia cochinchinensis* (Lour.) W.
Clayton 429

Monograph 29: *Setaria faberi* Herrm., *Setaria glauca*
(L.) Beauv. and *Setaria viridis* (L.)
Beauv. 434

Monograph 30: *Sorghum halepense* (L.) Pers. 441

Monograph 31: *Urochloa platyphylla* (Munroe ex C.
Wright) R. D. Webster 450

Monograph 32: *Xanthium strumarium* L. and *Xanthium*
spinosa L. 454

Section IX

Methods for the Preparation of Sections 463

Chapter 55 Tissue Preparation and Staining
Procedures 465

References 472

Index 482