Contents

Abbreviations Preface to second edition				
Section	A	Introduction	1	
	A1	Introduction	1	
Section B		Understanding plants – methods in plant biology	5	
	B1	Arabidopsis and other model plants	5	
	B2	Methods in experimental plant science	8	
	B3	Studying plant evolution and ecology	16	
Section C		Plant cells	21	
	C1	The plant cell	21	
	C2	The cell wall	24	
	C3	Plastids and mitochondria	27	
	C4	Membranes	29	
	C5	Nucleus and genome	33	
	C6	Cell division	36	
Section	D	Vegetative anatomy	41	
	D1	Meristems and primary tissue	41	
	D2	Roots	45	
	D3	Herbaceous stems and primary growth	50	
	D4	Woody stems and secondary growth	53	
	D5	Leaves	56	
Section E		Plants, water and mineral nutrition	59	
	E1	Plants and water	59	
	E2	Water retention and stomata	65	
	E3	Movement of nutrient ions across membranes	68	
	E4	Uptake of mineral nutrients by plants	72	
	E5	Functions of mineral nutrients	75	
Section F		Metabolism	79	
	F1	Photosynthetic pigments and the nature of light	79	
	F2	Major reactions of photosynthesis	82	
	F3	C3 and C4 plants and CAM	88	
	F4	Respiration and carbohydrate metabolism	92	
	F5	Amino acid, lipid, polysaccharide and		
		secondary product metabolism	98	
Section	G	Reproductive biology	105	
	G1	The flower	105	
	G2	Pollen and ovules	109	
	G3	Breeding systems	112	
	G4	Self incompatibility	116	
	G5	Ecology of flowering and pollination	121	

Contents

265

Section H	Seeds and fruits	125
H1	The seed	125
H2	Fruits	129
H3	Fruit and seed dispersal	131
H4	Seed dormancy	135
H5	Regeneration and establishment	138
	0	
Section I	Sensing and responding to the environment	143
I1	Photoperiodism, photomorphogenesis and	
	circadian rhythms	143
I2	Tropisms	149
I3	Nastic responses	153
I4	Abscission	156
15	Stress avoidance and adaptation	158
	1	
Section I	Growth and development	163
I1	Features of growth and development	163
12	Biochemistry of growth regulation	167
I3	Molecular action of plant hormones and	
je	intracellular messengers	176
14	Physiology of floral initiation and development	183
<u>j</u> =		200
Section K	Plant genetic engineering and biotechnology	185
K1	Plant breeding	185
K2	Plant cell and tissue culture	187
K3	Plant genetic engineering	192
100	Think genetic engineering	1/4
Section L	Plant ecology	199
I 1	Fcology of different growth forms	199
L2	Physical factors and plant distribution	202
1.3	Plant communities	202
L0 L4	Populations	200
L5	Polymorphisms and population genetics	215
L6	Contribution to carbon balance and atmosphere	210
LU	contribution to curbon buturee and utiliosphere	21/
Section M	Interactions between plants and other organisms	223
M1	Mucorrhiza	223
M2	Nitrogen fixation	228
M3	Interactions between plants and animals	231
M4	Fungal nathogens and endonhytes	235
M5	Bacteria myconlasma viruses and heterokonts	230
M6	Parasites and sanronhytes	20)
M7	Carnivorous plants	241
TATA	Curravorous prants	270
Section N	Human uses of plants	249
NI1	Plants as food	210
ND	Plants for construction	255
NI2	Plants in medicine	250
N4	Plants for other uses	261
TAT.	A AVAILOU TOT OTHER MOOD	An UI

vi

N4 Plants for other N5 Bioremediation Contents

Sectio	on O	Algae and bryophytes	2	269	
	01	The algae	2	269	
	O2	The bryophytes	2	273	
	O3	Reproduction in bryophytes	2	278	
Sectio	n P	Spore-bearing vascular plants	2	283	
	P1	Early evolution of vascular plants	2	283	
	P2	Clubmosses and quillworts	2	288	
	P3	Horsetails	2	292	
	P4	Ferns	- 2	295	
Section Q		Seed plants	3	303	
	Q1	Early seed plants	3	303	
	Q2	Conifers	3	307	
	Q3	Cycads, ginkgo and Gnetopsida	3	312	
	Q4	Evolution of flowering plants	3	317	
	Q5	General features of plant evolution	3	325	
Further reading		3	331		
Index			3	841	