

Contents

1	Photosynthesis	2
1.1	The effect of external factors on the rate of photosynthesis	2
1.2	Adaptations to different light intensities	4
1.3	Compensation point	7
1.4	Adaptation to latitude	8
1.5	The chloroplast and photosynthesis	8
1.6	Pigments, wavelengths and photosynthesis	9
1.7	The conversion of carbon dioxide in photosynthesis	10
1.8	The source of ATP in photosynthesis	13
1.9	Photosynthesis and respiration	14
1.10	Carbon dioxide uptake and release	15
1.11	Yields of natural vegetation and crops in photosynthesis	16
1.12	Crop yield	17
2	Germination and Growth	18
2.1	Seed dormancy	18
2.2	Changes on germination	19
2.3	Germination in light and dark	20
2.4	Growth curves	21
2.5	Growth of three organisms	22
2.6	Potato growth	22
2.7	Root growth	23
2.8	Plant growth over twelve weeks	24
2.9	Measurement of growth	24
2.10	Environmental factors affecting growth	25

viii Contents

2.11	Bacterial population growth	26
2.12	Continuous culture	26
2.13	Plankton population growth	27
2.14	Growth of three different populations	28

3 Water Relations

3.1	The effect of external factors on the rate of transpiration	29
3.2	The effect of light intensity on the rate of transpiration	30
3.3	Water loss and stomatal distribution	32
3.4	Methods of measuring transpiration	33
3.5	Transpiration and water absorption	35
3.6	Xerophytic plants	36
3.7	Hydrophytes	38
3.8	Biological significance of turgor	40
3.9	Dandelion stems	42
3.10	Ion absorption	43

4 Translocation

4.1	The pathway of movement for solutes in the plant	44
4.2	The pathway of movement for organic materials	45
4.3	Movement of organic substances	46
4.4	Transport in the phloem	46
4.5	Diurnal movement of xylem sap	47
4.6	Mechanism of movement up the xylem	48

5 Respiration

5.1	Measuring respiratory quotient	51
5.2	Respiratory quotients	52
5.3	Respiratory quotient of seedlings	53
5.4	Stored seeds	54
5.5	Apple fruit growth	54

5.6	Fermentation by yeast juice	55
5.7	General properties of enzymes	56
5.8	Enzyme activity and pH	57

6 Plant Hormones

6.1	Early work on phototropism	58
6.2	Phototropism	60
6.3	Geotropism in roots	61
6.4	Auxins in stem and root	62
6.5	Geotropism	63
6.6	Transport of auxin	64
6.7	Buds and auxins	65
6.8	Auxin and fruit development	66
6.9	The development of strawberries	67
6.10	The effect of plant growth substances on fruit set	68