

Contents

1	Salt Supply	I
1.1	Sources of mineral salts	
1.2	Composition of plant ash	
1.3	Genetic control of salt content	
1.4	Influence of the environment	
1.5	Salt absorption and growth	
1.6	Solution culture	
2	Salt Requirement	II
2.1	Essential and non-essential elements	
2.2	The essential elements	
2.3	Nitrogen, sulphur and phosphorus	
2.4	Calcium, magnesium and potassium	
2.5	Iron	
2.6	Copper, manganese and zinc	
2.7	Molybdenum and boron	
2.8	Chlorine and sodium	
2.9	Beneficial elements	
2.10	Toxic effects of mineral elements	
3	Ion Absorption by Cells	26
3.1	Membrane potential	
3.2	Free space uptake	
3.3	The carrier concept	
3.4	The energetics of active transport	
3.5	Accumulation in the cytoplasm and vacuole	
3.6	Factors affecting ion uptake	
4	Ion Uptake by Plants	40
4.1	Uptake from the soil	
4.2	Transport in the free space	
4.3	Transport in the symplasm	
4.4	The endodermis	
4.5	Root exudation	
4.6	Relationship between water and ion transport	
4.7	Foliar absorption of ions	
5	Distribution of Ions	49
5.1	Patterns of ion distribution and circulation	
5.2	Transport in the xylem	
5.3	Transport in the phloem	
5.4	Accumulation in storage organs	
5.5	Ion distribution in germinating seeds	
	Further Reading and References	59