TABLE OF CONTENTS

References

8. Inhibitors of Lipid Biosynthesis

8.1 Introduction

8.2 Structures and uses of graminicides

8.3 Inhibition of lipid biosynthesis

8.4 Activity of graminicides in mixtures

8.5 How treated plants die

8.6 Plant oxylipins: Lipids with key roles in plant defence and development

8.7 Selectivity

References

9. Inhibition of Amino Acid Biosynthesis

9.1 Introduction

9.2 Overview of amino acid biosynthesis in plants

9.3 Inhibition of glutamine synthetase

9.4 Inhibition of aromatic amino acid biosynthesis

9.5 Inhibition of branch-chain amino acid biosynthesis

9.6 Inhibition of histidine biosynthesis

References

10. Disruption of the Plant Cell Cycle

10.1 Introduction

10.2 The plant cell cycle

10.3 Control of the plant cell cycle

10.4 Microtubule structure and function

10.5 Herbicidal interference with microtubules

10.6 Selectivity

References

11. The Inhibition of Cellulose Biosynthesis

11.1 Introduction

11.2 Cellulose biosynthesis

11.3 Cellulose biosynthesis inhibitors

11.4 How treated plants die

11.5 Selectivity

References

12. Plant kinases, phosphatases and Stress Signalling

12.1 Introduction

12.2 Plant kinases

12.3 Plant phosphatases

12.4 Cyclin-dependent kinases and plant stress

12.5 Post-translational modification of proteins

References

13. Herbicide Resistance

13.1 Introduction

13.2 Definition of herbicide resistance

13.3 How herbicide resistance occurs

13.4 A chronology of herbicide resistance

13.5 Mechanisms of resistance

13.6 Case Study: Blackgrass (*Alopecurus myosuroides* Huds)

13.7 Strategies for the control of herbicide-resistant weeds

13.8 The future development of herbicide-resistance

References

14. Herbicide-Tolerant Crops

14.1 Introduction

14.2 History of genetically-modified, herbicide-tolerant crops

14.3 How genetically-modified crops are produced

14.4 Genetically engineered herbicide-tolerance to glyphosate

14.5 Genetically-modified herbicide-tolerance to glufosinate

14.6 Genetically-modified herbicide-tolerance to bromoxynil

14.7 Genetically-modified herbicide-tolerance to sulphonylureas

14.8 Genetically-modified herbicide-tolerance to 2,4-D

14.9 Genetically-modified herbicide-tolerance to fops and dims

14.10 Genetically-modified herbicide -tolerance to phytoene desaturase inhibitors

14.11 Herbicide-tolerance due to engineering of enhanced metabolism

14.12 Herbicide-tolerance through means other than genetic modification

14.13 Gene editing

14.14 Economic, environmental and human health benefits from the adoption of GM technology

14.15 Gene stacking

14.16 Will the rise of glyphosate be inevitably followed by a fall?

14.17 Why is there so much opposition to GM technology?

14.18 Future prospects

References

15. Further Targets For Herbicide Development

15.1 Introduction

15.2 Protein turnover

15.3 The promotion of ageing in weeds?

15.4 Herbicide leads at the apicoplast