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Plant Growth Substances

L.J. AUDUS

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PLANT GROWTH SUBSTANCES

Volume 1: Chemistry and Physiology

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Preface to the Third Edition

In the six-year interval between the publication of the first and second editions of this book, information on the principles and practice of chemical plant growth regulation had grown so much as to necessitate a 50 per cent increase in size. Since then the relative growth rate of the literature on plant growth substances has progressively steepened over the years; to maintain the comprehensive cover and detail of the first two editions a two- to three-fold increase in size over the second edition is required. Qualitatively, too, the whole field has changed. In 1958 the gibberellins were relative newcomers; now they attract as much, if not more attention than the auxins. Then kinetin was little more than an academic curiosity; now the role of cytokinins in the control of plant growth is perhaps better understood than that of the auxins. Natural inhibitors, then only dimly suspected as playing a part in growth regulation, have now come into their own, particularly in the shape of abscisic acid and its structural relatives. Furthermore the application of many new physical, chemical and biochemical techniques to the study of the phytohormones has revolutionised our concepts of role and mechanism and has revealed phytohormone participation in many previously unsuspected areas of plant biology.

Such considerations, and many others of a purely practical nature, have called for a complete restructuring in the third edition. The vastly increased bulk of material demands two volumes instead of one; in order to conserve the maximum of independent usefulness for each volume, the restructuring has distinguished as far as possible between the various aspects of the subject and has grouped them into two logical units. The present volume deals with the chemistry, metabolism, general physiology and mode of action of plant growth substances, both natural and synthetic. Some chapters remain as updated versions from the second edition (viz. those on the natural and synthetic auxins, on natural plant growth inhibitors,

on growth substances in the soil and on reproductive hormones). Others have been completely redrafted, e.g. that on hormone mechanisms. There are five completely new chapters, i.e. on the gibberellins, the cell-division hormones, synthetic plant growth inhibitors and retardants, ethylene and the control of hormone levels at the sites of their actions. The second volume will deal with the role of plant growth substances in the control of various aspects of growth and development in the plant and its organs and particularly with their practical uses in agriculture and horticulture, i.e. the remaining facets of the subject covered in the first two editions.

The first edition unashamedly tried to cater for 'all classes of reader'. The second edition struggled against increasing technical difficulties to maintain that aim and was thereby mildly criticised by some reviewers for being unrealistic on that score. The intervening years have turned difficulties into impossibilities and the present edition has therefore been written for the reader with a broad understanding of the basic principles of chemistry, biochemistry and physics, i.e. the advanced student who, in one scientific discipline or another, needs to inform himself of the nature and functioning of plant growth regulating substances. However in writing this new edition I have still tried to cater for those physical scientists who may feel the need for help in understanding the more technical aspects of plant biology. As far as possible, to be consistent with conciseness, biological phenomena have been described in simple non-technical terms and because this was sometimes impossible to maintain a glossary of some technical terms has been included at the end of the text.

Many new illustrations have been incorporated both as photographs and as graphs and diagrams. I wish to acknowledge with gratitude the generosity of the many fellow scientists who have allowed me to use their photographic records and their research observations in the construction of the figures in this volume. Their names are thankfully recorded at the appropriate points in the text.

L. J. Audus,
Stanmore, Middlesex.
March 1972

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