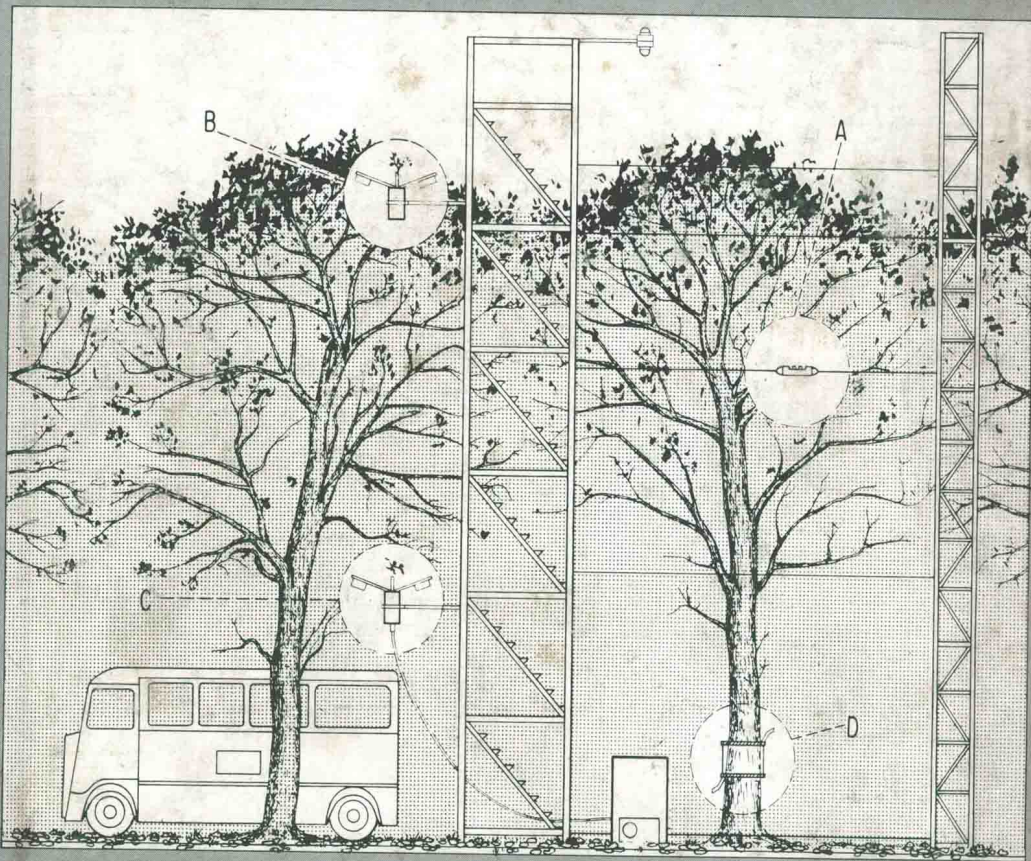


Environmental Effects On Crop Physiology



edited by J.J.Landsberg and C.V.Cutting

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Fifth Long Ashton Symposium 1975

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Edited by J. J. LANDSBERG *and* C. V. CUTTING

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**Environmental Effects
on
Crop Physiology**

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Preface

The influence of environmental factors on the growth of crops has been observed for centuries, as may be seen from Professor Stanhill's quotation of Theophrastus:-

For growth and nourishment, the climate is the most important factor—there is an apt proverbial saying that it is the year which bears and not the field.

The quantification and interaction of such influences at various stages of physiological development are of recent study and it is appropriate that they should be the subject of a Long Ashton Symposium—the aim of the series being to focus on a topic in agriculture or horticulture where an appraisal of current ideas is opportune. It is hoped that this function is reflected in the range of contributions dealing with weather and crop productivity; the physiological processes of assimilate production, respiration and translocation; critical stages of plant development; and modelling and synthesis of results. The nineteen papers of international origin, together with the discussions that they generated should help to give a broader appreciation to those working in several disciplines, and assist an integration of their approaches.

The need for such interdisciplinary interchanges between crop scientists was stressed by Professor de Wit in his "Concluding Remarks":

We may go on studying details for ever, without developing our knowledge any further . . . we should reduce our analytical efforts and synthesize and unify. [In this respect] the Symposium generated much discussion about modelling . . . and these models should provide the link between plant physiology in the laboratory, and problems in the field . . . a basis for generalization and new ideas for experimentation.

The Symposium, held in the year of Professor J. P. Hudson's retirement, had the benefit of his Inaugural Address, reflecting his life-long interests in plants and the weather. One of the challenges in his stimulating contribution was an appeal that:

Mathematicians, physicists and microclimatologists [who] like to talk in their own private shorthand . . . might bend their minds to finding ways of presenting these concepts in ways that non-mathematicians can understand. Otherwise few farmers, and not all agronomists or biologists, may be able to benefit fully from their findings about the weather and plants, however important this may be.

The farmer has some help in interpretation through advisory staff and publications, but stronger links remain to be forged between the agronomist and biologist. If this book helps to extend such an understanding as well as providing a source of knowledge, its purpose will be well fulfilled.

We would wish to express our appreciation of the ready assistance given by contributors in the preparation of papers for pre-circulation before the Symposium, and to the staff of Academic Press for their cooperation in the production of this volume. Throughout the Symposium and the preparation of this volume, Mrs B. Courtice gave valuable secretarial assistance.

Finally, we wish to acknowledge the cooperation of the Editors of the Journals concerned who have granted permission to produce diagrams and tables, as indicated in the respective captions.

J. J. Landsberg
C. V. Cutting

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INAUGURAL LECTURE

Plants and the Weather

J. P. HUDSON

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INTRODUCTION

I became interested in the relations between weather and plants when I heard two brilliant lectures—by F. G. Gregory and G. H. Edelman—in 1950 (Edelman, 1953; Gregory, 1953), and I have been interested ever since. The weather has not changed much since the early 1950s, nor have plants, but there has been a big change in our understanding of the structure of the microclimate, and the relations between plants and details of the weather.

The rapid growth of this branch of science has been due, in no small part, to the efforts of a small band of physicists (several of whom are present at this Symposium) whose work has encouraged biologists to look at plants in a much better-informed way. So I was delighted to be invited to talk about plants and the weather, but puzzled to know what a retiral lecture calls for? Is it a few benign platitudes, befitting an elderly gentleman who is looking forward to a quiet life? Or is it an occasion for a final abrasive attack, lashing out in all directions in the hope that someone will still listen? Perhaps it does not matter much, because a retiral speech is very much a one-off job and one is not likely to be asked to give another.

THE CHALLENGE TO CROP HUSBANDRY

The two central problems in crop husbandry are to double production by the end of the century (a formidable target indeed) and to reduce random variations in yield, so that distribution, storage and marketing can be more orderly processes, with fewer gluts and shortages. Neither of these objectives can be achieved without a better understanding of the effects of weather on plants, so this meeting is very relevant to these central problems of our times. My contribution is mainly concerned with the element of luck in crop production,

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