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Progress in our Understanding of Plant Growth

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Abstract

EFFORTS to improve plant production are increasingly dependent on a better understanding of plant metabolism and growth. A summary is given of the present state of our knowledge in some branches of plant physiology. Recent work in mineral nutrition suggests that more than the usually accepted 13 elements may be essential for growth. There is some evidence that particular plants may require elements not generally essential. The processes of transport of nutrients in the plant are proving more complex than hitherto believed. Thus in the xylem stream there is movement of some organic compounds as well as of inorganic ions. The movement of calcium in the phloem appears to be greatly restricted, leading to localised deficiencies of this element in some developing organs. Four distinct types of plant hormones have now been recognised in many plants. These compounds have characteristic biological activity and are responsible for the stimulation or inhibition of many aspects of plant growth. Plants are now known to possess methods for regulating their metabolism. Thus at least two enzymes—nitrate reductase and urease—are known to be induced enzymes, that is, are produced only when the appropriate substrate is present.

INTRODUCTION

GREEN plants provide the basis for all life on this planet. This fact alone would appear to provide sufficient justification for talking about the growth of green plants. The immediate dependency of the economy of this country on the satisfactory growth of plants would seem to give additional relevancy to the subject here. Yet, in the scientific atmosphere of today, I feel some justification is necessary. A recent article in *Nature* (220, 521: 1968) entitled "Is Botany Dead?" summarised various doubts held by some people about the current scientific status of the study of plants.

In the past in the development of biology, research with higher plants has made notable contributions to fundamental knowledge. When Mendel did his original genetic work it was perfectly natural for him to work with a higher plant, the pea plant. Later, in this century, the first enzyme to be obtained in pure crystalline form from any living organism was obtainable from the seeds of a bean. Again the first virus to be isolated from any type of organism was obtained from tobacco plants. In more recent years much of the work in the field of biochemistry has been with micro-organisms or animal tissues. In particular, most of the more

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