PLANT PHYSIOLOGY

WITH SPECIAL REFERENCE TO

PLANT PRODUCTION

BY

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PREFACE

In the preparation of this text and reference book, the writer has attempted to consider both the student and the general reader, interested alike in the fundamental requirements of plants and in plant production. Throughout biological study at the present time increased emphasis is placed on the activities and responses of organisms. It is instruction in this type of biological phenomena that is rapidly becoming a part of the cultural side of education, and the practical value of such knowledge is every day being demonstrated, — notably in agriculture and medicine. Plant physiology finds its practical application in plant production, to which it stands in much the same relation as does industrial chemistry to general manufacturing.

It is somewhat strange, therefore, to find that as a separate course plant physiology is not yet offered in some of the colleges whose purpose is primarily to train persons for practical or rural pursuits. Such students require some fundamental work, and few will become specialists. For this general class of students, and for other readers as well, there seems to be needed a text (1) that shall exhibit a considerable range of material, rather than a few topics exhaustively treated; (2) that shall include both qualitative and quantitative work; and (3) that shall keep in view, as far as possible, the relations of the science to plant production, drawing the illustrations, wherever convenient,

from plants which are familiar and directly useful. By maintaining some direct contact with practical problems, interest is aroused for further desirable fundamental preparation. "The idea that useful knowledge cannot be cultural must be dismissed. . . . Every possible application must be made of each abstract principle." (Eliot, "The Conflict between Individualism and Collectivism in a Democracy," page 66.)

In the field of pure physiology, there are recent texts and guides embodying much of what is considered best in the modern content and attitude of the science. An elaboration of the methods of quantitative study is there indicated, and stress is laid on the materials and energy involved in plant activity. Such books will be consulted with much profit.

In selecting from the great amount of available material that which has seemed to be most suitable for the present purpose, consideration has been given the fact that in many colleges general courses are offered, not only in such distinctively plant lines as agronomy, horticulture, and breeding, but likewise in fields overlapping physiology, or partially included in this subject, such as soils, bacteriology, pathology, and genetics. The subject-matter included is intended to be sufficient for a course of one-half year involving two recitations and two laboratory periods; but it may be made the basis of a shorter course by suitable selection of material, or of a longer course by an extension of the collateral work.

In the preparation of this text I have used freely any available source of information. The subject-matter has been presented at one time or another in class work. I am indebted to Mr. Lewis Knudson, Instructor in Plant Physi-

ology in Cornell University, for many suggestions and for the form of certain sections of the laboratory notes. Some of the illustrations were furnished by others, or borrowed, as credited in the text. Certain of the drawings were prepared by Miss Anna M. Keichline; others by Mrs. B. M. Duggar, of whose constant assistance with manuscript and proof I would express also my appreciation.

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