

**HANDBOOK OF THE
FARM SERIES. LIFE ON
THE FARM, PLANT LIFE**

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Handbook of the Farm Series. Life on the Farm, Plant Life by Maxwell T. Masters

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MAXWELL T. MASTERS

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HANDBOOK OF THE FARM SERIES

EDITED BY J. CHALMERS MORTON.

LIFE ON THE FARM.

PLANT LIFE

BY

MAXWELL T. MASTERS, M.D., F.R.S.

SECOND EDITION.

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1885.

THE present Volume is the fifth of a series of seven which, among them, discuss the Cultivation of the Farm, its Live Stock, and its Cultivated Plants, Farm and Estate Equipment, the Chemistry of Agriculture, and the Processes of Animal and Vegetable Life. Among the writers who have been engaged on them are Messrs. T. BOWICK, W. BURNES, G. MURRAY, the late W. T. CARRINGTON, the Rev. G. GILBERT, Messrs. J. HILL, SANDERS SPENCER, and J. C. MORTON, Professors J. BUCKMAN, J. WORTLEY-AXE, and J. SCOTT, Dr. M. T. MASTERS, F.R.S., and Mr. R. WARINGTON, F.C.S.

It will be seen from the above announcement that a seventh volume is added to the six originally contemplated—the Processes of Animal and Vegetable Life requiring more than one for even the elementary discussion of them, which alone is here attempted.

J. C. M.

PREFACE.

RIGHTLY to understand what work is done by living plants, and how it is effected, not only requires a student to be a botanist in the ordinary sense of the word, but necessitates that he should also have a comprehensive knowledge of physics and of chemistry.

In few individuals can such an extensive knowledge now-a-days be expected. The practical cultivator especially, harassed by the daily cares of his occupation, is not able to master the endless details of these sciences; and yet experience shows the increasing necessity for furnishing him with new tools and new weapons to enable him to utilise the resources of Nature, and to contend against adverse circumstances. Such tools, such weapons are furnished by the armoury of science. It is the object of this Handbook to point out the nature of these resources, and suggest the methods of utilising them. Something will be gained if only a right appre-

ciation of what cannot be done is obtained, as thereby labour on a sterile soil will be avoided, to be applied with more reasonable hope of success elsewhere.

In the following pages an attempt has, therefore, been made to supply a sketch, necessarily in faintest outline, of the physiology or life-history of plants ; of the way in which they are affected by the circumstances under which they exist, and of the manner in which they in their turn react upon other living beings and upon natural forces. Of necessity, there has been a little overlapping in the case of some of the subjects treated of in the companion volume, "The Chemistry of the Farm," by Mr. Warington ; but as the matters are looked at from a different stand-point, and as no pretence is here made to impart special chemical knowledge, it is hoped that Mr. Warington and the reader also will forgive any slight incursions into a territory which the writer has no claim to enter except upon sufferance.

Structural botany, whether dealing with the outer conformation or the internal organisation of plants, is only incidentally treated of in these pages ; the classification of plants is also passed over without notice, as not coming within the scope of this Handbook. Information of an elementary character on

these points is given in the author's "Botany for Beginners,"* to which the present volume is in some sense complementary.

Detailed text-books of Botany, or of Vegetable Physiology, expressly adapted to the requirements of agriculturists do not exist, but there are many works from which a comprehensive general idea of the present state of knowledge on these subjects may be obtained.

Foremost among them is the second English Edition of Sachs' "Text Book of Botany," edited by Dr. Vines.

The "Elementary Text Book of Botany," by Prantl, of which an English edition has been published, also under the supervision of Dr. Vines—is in some sense an abridgment of Sachs' larger volume. Of similar nature is "The Text Book of Structural and Physiological Botany," by Thomé, edited by Mr. Alfred Bennett. The third edition of Henfrey's "Elementary Course of Botany," edited by the present writer, is, like Bentley's "Manual of Botany," more comprehensive in scope than the works last named.

In the compilation of the following pages the writer has availed himself of the foregoing works, as

* Published by Messrs. Bradbury, Agnew, & Co.

well as of Van Tieghem's "Traité de Botanique," the French translation of Sachs' "Physiologie Végétale" by Micheli, and Dehérain's "Cours de Chimie Agricole." The works and memoirs of Darwin have, of course, been laid under contribution, as well as numerous scattered papers by various authors. More especially the writer has to acknowledge his obligations to the voluminous records of the noble series of cultural experiments carried out at Rothamsted for so many years by Sir John Lawes and Dr. Gilbert. So far as at present published, these records and reports are chiefly to be found in successive volumes of the Royal Agricultural Society's Journal. The very elaborate papers on the mixed herbage of Permanent Meadow from which most of the facts alluded to in the chapter headed "The Battle of Life" have been taken, are published in the "Philosophical Transactions" of the Royal Society. The "Memorandum Sheet" published by these experimenters supplies annually a condensed summary of the results of their experiments, and is a document that should be carefully studied with due reference to its professed object, by all who have the advancement of agricultural knowledge at heart.

M. T. M.

April, 1883.

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