

**THE ROTHAMSTED EXPERIMENTS
ON THE GROWTH OF WHEAT,
BARLEY, AND THE MIXED
HERBAGE OF GRASS LAND**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649254125

The Rothamsted experiments on the growth of wheat, barley, and the mixed herbage of grass
land by William Fream

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

WILLIAM FREAM

**THE ROTHAMSTED EXPERIMENTS
ON THE GROWTH OF WHEAT,
BARLEY, AND THE MIXED
HERBAGE OF GRASS LAND**

THE
ROTHAMSTED EXPERIMENTS
ON THE
GROWTH OF WHEAT, BARLEY,
AND THE
MIXED HERBAGE OF GRASS LAND.

BY
WILLIAM FREAM, B.Sc. Lond., F.L.S., F.G.S., F.S.S.,
ASSOCIATE OF THE SURVEYORS' INSTITUTION; CONSULTING BOTANIST
TO THE BRITISH DAIRY FARMERS' ASSOCIATION AND THE
ROYAL COUNTIES AGRICULTURAL SOCIETY; PROFESSOR
OF NATURAL HISTORY IN THE COLLEGE OF AGRICULTURE,
DOWNTON, SALISBURY, AND FORMERLY PROFESSOR OF NATURAL HISTORY
IN THE ROYAL AGRICULTURAL
COLLEGE, CIRENCESTER.

LONDON:
HORACE COX, "THE FIELD" OFFICE, 346, STRAND, W.C.

1888.

a. B. C.

LONDON :
PRINTED BY HORACE COX, 10, WELLINGTON STREET, STRAND, W.C.

S543
R8F7

TO
SIR JOHN BENNET LAWES, BART., LL.D., F.R.S.,
AND
PROF. JOSEPH HENRY GILBERT, M.A., LL.D., F.R.S.,
WHOSE LONG-CONTINUED AND SUCCESSFUL
INVESTIGATIONS IN EVERY DOMAIN OF
AGRICULTURAL INQUIRY HAVE MADE
THE NAME OF THE ROTHAMSTED
EXPERIMENTAL STATION
FAMOUS THROUGHOUT
THE WORLD,
THIS VOLUME, RECORDING THE METHODS AND
RESULTS OF SOME OF THEIR RESEARCHES,
IS BY PERMISSION RESPECTFULLY

Dedicated.

M368238

PREFACE.

HAVING had occasion to study somewhat closely the work of the Rothamsted investigators, it occurred to me that their valuable memoirs, dealing as they so largely do with actually ascertained results, might be advantageously condensed into the form of a text-book. Hence arose the present volume which, though it is concerned with a portion only of the many questions that have been brought within the range of experimental inquiry at Rothamsted, yet deals with subjects of first class importance, equally in their scientific bearing as in their economic aspect. To the student the discussion of concrete results should prove at least as useful as the consideration of abstract assertions, whilst it is possible that it may be even more suggestive.

In the endeavour to make each subject as far as possible complete in itself, a certain amount of repetition has been unavoidable. Many questions, again, which are but lightly touched upon in these pages, are more fully dealt with in other of the Rothamsted memoirs than those which the writer has laid under contribution. Even as this work is passing through the press a fresh memoir issuing from Rothamsted throws further light upon the classical inquiry as to the sources of the nitrogen of vegetation.

In several instances the information here given is brought very nearly down to date. This has been rendered possible only through the characteristically kind and ready manner in which Sir John Lawes and Dr. Gilbert have responded to my requests, and for which my grateful acknowledgments are tendered.

At the present time, when there has been preferred a somewhat vague demand that the Government should undertake the support of agricultural experiment stations, it seems a fitting moment in which to make more widely known the nature and results of the splendid work which private enterprise has with such conspicuous success maintained at Rothamsted. Whatever merits this book may possess are due to the illustrious investigators with whose name the volume is associated. Its faults, whatever they be, are mine alone.

W. FREAM.

COLLEGE OF AGRICULTURE,
DOWNTON, SALISBURY,
January, 1888.

CONTENTS.

	PAGE
I. INTRODUCTORY	1
<hr/>	
WHEAT.	
II. EARLY EXPERIMENTS ON WHEAT	6
1. THE HOLKHAM EXPERIMENTS	6
2. THE RODMERSHAM EXPERIMENTS	12
III. EXPERIMENTS ON THE CONTINUOUS GROWTH OF WHEAT UPON THE SAME LAND FOR FORTY YEARS	18
PLAN OF THE EXPERIMENTS	19
INFLUENCE OF SEASON ON THE WHEAT CROP	23
EFFECTS OF THE UNEXHAUSTED RESIDUE OF MANURES	30
CONTINUOUS GROWTH OF WHEAT UPON THE SAME LAND FOR FORTY YEARS WITHOUT MANURE	35
WITH MINERAL MANURES ALONE	38
WITH AMMONIA-SALTS ALONE... ..	41
WITH AMMONIA-SALTS AND MINERAL MANURES IN ALTERNATING YEARS ...	43
COMPARISON BETWEEN AMMONIA-SALTS AND NITRATE OF SODA AS SOURCES OF NITROGEN	45

	PAGE
CONTINUOUS GROWTH OF WHEAT UPON THE SAME LAND FOR FORTY YEARS WITH FARM- YARD MANURE SUPPLIED EACH YEAR ...	49
QUANTITY OF AMMONIA REQUIRED TO PRO- DUCE AN INCREASE OF ONE BUSHEL PER ACRE IN THE WHEAT CROP... ..	54
THE ROTHAMSTED EXPERIMENTS ON THE CONTINUOUS GROWTH OF WHEAT COMPARED WITH THOSE AT WOBURN, HOLKHAM, AND RODMERSHAM	56
SUMMARY OF THE RESULTS OF FORTY YEARS' EXPERIMENTS ON THE CONTINUOUS GROWTH OF WHEAT UPON THE SAME LAND	58
IV. INFLUENCE OF CLIMATE ON THE CULTIVATION OF WHEAT	32
V. THE HOME PRODUCE, IMPORTS, AND CONSUMP- TION OF WHEAT	74

BARLEY.

VI. EXPERIMENTS ON THE CONTINUOUS GROWTH OF BARLEY UPON THE SAME LAND FOR TWENTY YEARS	87
CHARACTERISTICS OF THE BEST AND WORST SEASONS OF THE TWENTY YEARS	92
AVERAGE YIELD OF BARLEY PER ACRE PER ANNUM FOR EACH DESCRIPTION OF MANURE	96
QUANTITY OF AMMONIA REQUIRED TO PRO- DUCE AN INCREASE OF ONE BUSHEL PER ACRE IN THE BARLEY CROP	103
EFFECTS OF THE UNEXHAUSTED RESIDUE OF MANURES	106
THE EXPERIMENTS ON THE CONTINUOUS GROWTH OF BARLEY COMPARED WITH OTHER SIMILAR EXPERIMENTS	111