

**THE WHEAT PROBLEM: BASED ON
REMARKS MADE IN THE
PRESIDENTIAL ADDRESS TO THE
BRITISH ASSOCIATION AT
BRISTOL IN 1898**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649733064

The Wheat Problem: Based on Remarks Made in the Presidential Address to the British Association at Bristol in 1898 by William Crookes

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 CROOKES

**THE WHEAT PROBLEM: BASED ON
REMARKS MADE IN THE
PRESIDENTIAL ADDRESS TO THE
BRITISH ASSOCIATION
AT BRISTOL IN 1898**

THE WHEAT PROBLEM

*Based on Remarks made in the Presidential
Address to the British Association
at Bristol in 1898*

REVISED WITH AN ANSWER TO VARIOUS CRITICS

BY

SIR WILLIAM CROOKES, O.M., F.R.S.

THIRD EDITION

WITH PREFACE AND ADDITIONAL CHAPTER BRINGING THE
STATISTICAL INFORMATION UP TO DATE, AND A CHAPTER ON

FUTURE WHEAT SUPPLIES

BY

SIR R. HENRY REW

WITH AN INTRODUCTION BY LORD RHONDDA

UNIVERSITY OF
CALIFORNIA

LONGMANS, GREEN, AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY AND CALCUTTA

1917

All rights reserved.

28/11/12

HD 9047
M9C8
1717

28/11/12
HD 9047
M9C8
1717

L. C.

INTRODUCTION

PARLIAMENT in enacting the Corn Production Act has decided rightly or wrongly that our National policy for some years to come shall be to make our country more self-supporting in the matter of food. The time has therefore come for us to consider the fundamentals of the task which is set before us.

If we grow food, we should grow the best food. Contemporary physiology ratifies the ancient opinion that bread, and above all wheaten bread, is the staff of life. Recent discoveries of "vitamines," or "accessory factors" of diet, merely confirm this opinion when they demonstrate the richness of wheat not only in all the ingredients hitherto recognised as necessary for our support, but also in these newly-identified factors.

Wheat then is the food we should grow, and increased food production really resolves itself into growing more wheat. Now more wheat can be grown in two ways—by increasing the area under that crop or by increasing the yield per acre. The Corn Production Act will increase the wheat area. It is the part of science to increase the yield.

Much has been done already in this direction. The work of Professor R. H. Biffen and the Cambridge School of Agriculture based upon the Mendelian conception of heredity, which was demonstrated in this country by Professor William Bateson, has resulted in the production of new

varieties of wheat which yield 10 per cent. more grain per acre than other varieties and possess also the excellent milling and baking qualities of the highest grade wheat from Canada and the United States.

Furthermore, the work of the Rothamsted Experimental Station, founded by Sir John Lawes and directed by the late Sir Henry Gilbert and more recently by Mr. A. D. Hall and his successor, Dr. E. J. Russell, has demonstrated that the prime factor in wheat production is a sufficient supply of nitrogenous manure. Yields of wheat exceeding the national average have been reaped from certain of the Rothamsted plots continuously every year for eighty years by judicious cultivation and manuring, and there is at least one instance in this country of successful continuous wheat-growing on the farming scale on Rothamsted lines. Experience gained during the war has further shown that fine crops of cereals can be grown by suitable manuring on newly broken up grassland without the expense of growing preparatory non-cereal crops. Obviously, the accepted views as to rotation of crops stand in need of revision.

Another point which has for years gained universal acceptance in agricultural circles—the view that livestock with its by-product farmyard manure is the backbone of wheat production—is also in the melting pot. Farmers are far too prone to regard farmyard manure—that variable mixture of unknown chemical compounds, bacteria and protozoa—as the panacea of all the ills that soils are heir to. It is true that farmyard manure supplies a quantity of nitrogenous food to the plant which should be

zealously preserved for manurial purposes, but it is also true that on the average half of this is lost by the rough and ready methods of preservation practicable on the farm. It must not be forgotten, too, that farmyard manure supplies humus to the soil without which permanent fertility is difficult to maintain. But in spite of these considerations, it cannot be denied that a greatly increased home production of nitrogenous manure is indispensable if the home production of wheat is to be increased to anything like the extent required to make the country self-supporting.

The value of fixed nitrogen in the form of Chilian Nitrates has long been known. Longer still have the chemists known that our atmosphere is mostly nitrogen and that this element can be fixed or combined with other elements by certain means—as by lightning, for instance. Man may command Nature by obeying her, in Bacon's phrase, and imitate the electric process. The electrical production of nitrates is now many years old.

The fixation of the atmospheric nitrogen is suggested by the chemist as his contribution to the maintenance and extension of the civilisations which depend upon wheat.

Such was Sir William Crookes's argument in the last decade of the nineteenth century. The time has now come when it is urgently necessary for us to avail ourselves of this gift from knowledge.

In Southern Norway, for years past, atmospheric nitrogen has been fixed to feed cereals. In Germany, especially since the War, our blockade having cut off the supply of Chilian Nitrates, nitrogen has been fixed by a more recent method, for food and for explosives.

Foreseeing the very plight in which his country, thanks to its aggression and our Navy, now is, the German chemist, Ostwald, devoted himself a few years ago to the practical development of nitrates from ammonia, and to the catalytic production of that compound from its constituent elements, nitrogen and hydrogen.¹ Some very small beginning has lately been made in this country with the employment of Ostwald's method. The production of synthetic ammonia depends in no degree upon a cheap supply of electricity. It is as feasible in this country, therefore, as in Southern Norway, and deprives us of our last excuse for our long neglect of this subject. Alike for agriculture, explosives, and dyes, synthetic ammonia is the beginning—and it is ours in any quantity for the making.

In the United States an immense scheme for the purpose is now afoot. In the country of the great chemist whose Presidential Address to the British Association roused all thoughtful minds nineteen years ago, comparatively little has been done. At the present time, there is in this country a shortage of artificial fertilisers, chiefly because there is a shortage of freight space. The nitrates are in abundance in Chili, but we need them here and shall increasingly need them.

The extent to which farmers in this country rely solely on farmyard manure is an instance of their conservatism or ignorance of modern developments in agricultural knowledge. The effect has lately been demonstrated by Mr. T. H. Middleton in a report for the Board of Agriculture, in which

¹ See "Chemistry in the Service of Man," by Professor Alexander Findlay, Second Edition, 1917, pp. 123-129. (Longmans, Green & Co).

he shows that, starting far behind in the race a generation ago, the German farmer now produces much more food per acre than the British, though he has a poorer soil and climate.

Farmers will ask what is to become of the enormously increased quantity of straw which will result from doubling or trebling the present corn area. It cannot be made into farmyard manure on present lines without doubling or trebling the livestock of the country, and that is impracticable, for we are already self-supporting as regards milk, we already produce two-thirds of the meat we consume, and the horse population is likely to decrease further as the use of motors increases.

Fortunately, there are other outlets for straw. A large quantity can be profitably disposed of for making straw board and the coarser kinds of paper, and if this does not suffice, it is by no means impossible that processes may be worked out which will make it practicable to convert straw into good fertilising material by the direct agency of bacteria without the assistance of animals.

In such circumstances, Sir William Crookes has revised and largely re-written his book. In this new edition he has considered not merely the recent statistics of wheat production, but also the judgments contained in certain of the valuable publications which we owe to the United States. The thoughtful American reader will do well to recognise in the following pages much that concerns him, scarcely less than it concerns ourselves. In the fixation of atmospheric nitrogen both Britain and the United States are laggards for whom it is difficult to find excuse.