

An Introduction to Crop Physiology

Second Edition

F. L. MILTHORPE and J. MOORBY

This book discusses how the various physiological processes in plants are integrated to produce the appropriate responses to the variable environment in the field. It is the first general textbook to bring together material normally found in detailed monographs and research papers. The authors consider all relevant aspects of crop physiology: the structure and effect of the environment, water relations, mineral nutrition, photosynthesis and respiration, germination and growth, flowering and fruiting. The emphasis is on understanding and predicting productivity. Most of the subject matter deals with agricultural systems, but many of the concepts are applicable to more complex natural ecosystems. The authors attempt to integrate knowledge from many different sources and to give an assessment in quantitative terms of the importance of each component in the plant-environment system.

This volume, which was extremely well received in its first edition, has been extensively revised to take account of recent developments in the field. It will continue to be an invaluable textbook for students of plant physiology, agronomy, horticulture, soil science and ecology, and an important source of reference for research workers in the same areas.

Hard covers £15.00 net
Paperback £4.95 net

CAMBRIDGE UNIVERSITY PRESS



Please reply to:
Box 371 Ashland, Mass. 01721

RETRIEVAL INDEX AND ABSTRACTS OF U.S. PATENTS

Report No. 13-78

PESTICIDES (1978)

ISBN 0-914428-63-2

- A SOURCE OF VALUABLE INFORMATION

Over 800 U.S. PATENTS ON PESTICIDES WERE ISSUED DURING 1978. Abstracts and Indexes (by pesticide category, chemical type and assignee or inventor) of these patents are provided by Lexington Data's® new report, "Pesticides" (1978). Covered are herbicides, herbicidal antidotes, plant growth regulants, fruit abscission agents, sucrose increasing agents, acaricides, arachnidicides, arthropodocides, fungicides, insecticides, miticides, nematocides, rodenticides and attractants. Complete coverage of all the patents in the chemical area by LDI® enables them to locate substantially all the important U.S. patents issued in this field.

RESEARCH MANAGERS, COMMERCIAL DEVELOPMENT DIRECTORS AND PATENT OFFICERS OF COMPANIES MANUFACTURING OR USING PESTICIDES will be provided with easy access to U.S. patents containing information leading to the solution of many research and technological problems. In addition, valuable insight is provided into the competitive technology and developments in this important field of agricultural chemistry.

- INFORMATION ORGANIZED FOR EASY RETRIEVAL

THE REPORT IS ORGANIZED AS FOLLOWS:

- Section I - Listing of Retrieval Categories
- Section II - Patent Index by Retrieval Categories
- Section III - Patent Index by Assignee or Inventor with Retrieval Categories
- Section IV - Chronological Listing of Patents with Retrieval Categories
- Section V - Abstracts (Major Claim) of All Patents Cited in the Index

- CONSIDERABLE SAVINGS IN TIME AND MONEY

THE COST OF OBTAINING PATENT INFORMATION has risen precipitously over the past few years. A thorough search of the many classes and subclasses that may contain relevant patents is both costly and time consuming. *Many of the patents in this field are not located either in the Fertilizer Chemistry or the Bio-Affecting Classes.* The purpose of Lexington Data® Reports is to provide the researcher, manufacturer and user of pesticides with access to U.S. patent information not readily accessible through the patent office classification system or through the *OFFICIAL GAZETTE OF THE U.S. PATENT OFFICE*. Much of the indexing information contained in LDI reports could be obtained only by reviewing the patents directly. *The LDI retrieval technique combines the benefits of a patent search and abstracting service.*

PRICE \$100.00

(ii)

*An invitation to contribute
and subscribe to*

Irrigation Science

Subscription Information

Volume 2 (4 issues) will appear in 1979.
Sample copy available upon request.

All countries (except North America)

1979. DM 148,- plus postage and handling.
Send your order or request to your book-
seller or directly to: Springer-Verlag, Journal
Promotion, P. O. Box 105280
D-6900 Heidelberg

North America

1979. US \$ 78.50 including postage and
handling. Send your order or request to:
Springer-Verlag New York Inc., 175 Fifth
Avenue, New York, NY 10010, USA
Subscriptions are entered with prepayment
only.

Representative for Australia
D. A. Book Depot Pty. Ltd., 11-13 Station
Street, Mitcham, Vic., 3132

Manuscripts in duplicate may be submitted to any of the following:

Co-ordinating Editor

Dr. G. Stanhill

Institute of Soils and Water, Agricultural Research Organization, Volcani Center,
P. O. Box 6, Bet Dagan, Israel

Co-Editors

Prof. R. J. Hanks

Department of Soil Science and Bio-
meteorology
Utah State University, Logan,
UT 84322, USA

Dr. H. E. Hall

Department of Botany and Plant
Sciences
University of California, Riverside,
CA 92521, USA

Dr. A. Kassam

15 Boundary Close
Tilehurst, Reading RG3 5ER, England

Prof. C. W. Rose

USDA Grassland Soil and Water
Research Laboratory
P. O. Box 748, Tempe, TX 76501, USA

Dr. N. C. Turner

CSIRO Division of Plant Industry
P. O. Box 1600, Canberra City, ACT2601,
Australia

Advisory Editors

J. F. Bierhuizen, Wageningen

S. K. De Datta, Manila

J. Doorenbos, The Hague

M. Hallaire, Versailles

R. D. Jackson, Phoenix, Arizona

P. G. Jarvis, Edinburgh

M. E. Jensen, Belville, Maryland

W. D. Kemper, Fort Collins, Colorado

J. W. Kijne, Nairobi

J. V. Lake, Wantage, Oxon

D. R. Nielsen, Davis, California

J. R. Philip, Canberra City

S. L. Rawlins, Riverside

D. Rijks, Niamey

N. J. Rosenberg, Lincoln, Nebraska

D. Shimshi, Gilat

B. D. Slavik, Praha

H. Taylor, Ames, Iowa

Irrigation Science will publish original contributions and short communications reporting the results of irrigation research, including relevant contribution from the plant, soil and atmospheric sciences as well as the analysis of field experimentation. Special emphasis will be given to multi-disciplinary studies dealing with the problems involved in maintaining the long term productivity of irrigated lands and in increasing the efficiency of agricultural water use.

Aspects of particular interest are:

- Physical and chemical aspects of water status and movement in the plant-soil-atmosphere system.
- Physiology of plant growth and yield response to water status.
- Plant-soil-atmosphere and water management in irrigation practice.
- Measurement, modification and control of crop water requirements.
- Salinity and alkalinity control by soil and water management.
- Ecological aspects of irrigated agriculture.



**Springer
International**

Continued from back page

PAGE

LUSH, W. M. and WIEN, H. C. The importance of seed size in early growth of wild and domesticated cowpeas	177
BHAT, K. K. S., FLOWERS, T. H. and O'CALLAGHAN, J. R. A model for the simulation of the fate of nitrogen in farm wastes on land application	183
BHAT, K. K. S. and O'CALLAGHAN, J. R. Behaviour in the soil of orthophosphate from pig slurry compared with that of KH_2PO_4	195
WITTY, J. F., ROUGHLEY, R. J. and DAY, J. M. Effect of plant spacing and soil application of aldicarb on nitrogen fixation by spring-sown field beans (<i>Vicia faba</i> L.)	203
WERNLI, C. G. and WILKINS, R. J. Nutritional studies with sheep fed conserved ryegrass. 1. Silage and dried grass offered <i>ad libitum</i> without supplements	209
WERNLI, C. G. and WILKINS, R. J. Nutritional studies with sheep fed conserved ryegrass. 2. Silage supplemented with dried grass or barley	219
NEVILL, D. J. and EVANS, ALICE M. The effect of host development on the field assessment of disease resistance to <i>Cercospora</i> leaf spots in groundnuts (<i>Arachis hypogaea</i> L.)	229
REID, I. M., ROBERTS, C. J. and BAIRD, G. D. The effects of underfeeding during pregnancy and lactation on structure and chemistry of bovine liver and muscle	239

SHORT NOTES

SINGH, B. R. and URIYO, A. P. The relationship between response to N and P fertilizers and soil N and P	247
HANNA, L. W. and SIAM, N. The estimation of moisture content in the top 10 cm of soil using a neutron probe	251
TULI, R. K. and SINGH, MEHAR. Lactic dehydrogenase activity in buffalo (<i>Bos-bubalis</i>) bull semen and seminal plasma in relation to various physical characteristics	255

THE JOURNAL OF AGRICULTURAL SCIENCE

CONTENTS

Vol. 94 Part 1 February 1980

	PAGE
BELL, G. D. H. The Journal of Agricultural Science 1905–1980: a historical record	1
WEATHERUP, S. T. C. Statistical procedures for distinctness, uniformity and stability variety trials	31
EGAN, A. R. and ULYATT, M. J. Quantitative digestion of fresh herbage by sheep. VI. Utilization of nitrogen in five herbage	47
RAO, M. K. and SUNDARESAN, D. Comparison of methods of extending part lactation records for sire evaluation	57
SINGH, M., MORE, T. and RAI, A. K. Heat tolerance of different genetic groups of sheep exposed to elevated temperature conditions	63
EVANS, G. and ROBINSON, T. J. The control of fertility in sheep: endocrine and ovarian responses to progestagen–PMSG treatment in the breeding season and in anoestrus	69
KENNEDY, P. M., LINDSAY, J. R. and MILLIGAN, L. P. <i>In vivo</i> measurement of rumen microbial growth using ³⁵ S	89
ROWLANDS, G. J. Concentrations of glucose, albumin, inorganic phosphate and sodium in the blood of beef calves at 2½ months of age and their relationships with subsequent weight gain	95
ZOMBADE, S. S., LODHI, G. N. and ICHHPONANI, J. S. Evaluation of protein quality of poultry feedingstuffs. 1. Comparison of chick bioassays	105
ZOMBADE, S. S., LODHI, G. N. and ICHHPONANI, J. S. Evaluation of protein quality of poultry feedingstuffs. 2. Fish meal	111
ZOMBADE, S. S., LODHI, G. N. and ICHHPONANI, J. S. Evaluation of protein quality of poultry feedingstuffs. 3. Expeller-processed oilseed cakes	117
DAVIES, I. Developmental characteristics of grass varieties in relation to their herbage production. 5. The effects of nitrogen treatment on the relative development of upper and lower internodes of mature reproductive tillers of <i>Dactylis glomerata</i> and <i>Lolium perenne</i>	125
CHATURVEDI, G. S., AGGARWAL, P. K. and SINHA, S. K. Growth and yield of determinate and indeterminate cowpeas in dryland agriculture	137
RAGAB, S. M. Water uptake and trans-potential in sunflower roots as influenced by ammonium ions	145
FREE, J. B. and FERGUSON, A. W. Foraging of bees on oil-seed rape (<i>Brassica napus</i> L.) in relation to the stage of flowering of the crop and pest control	151
WIDDOWSON, F. V., JOHNSTON, A. E. and PENNY, A. Multifactorial experimentation on continuous winter wheat grown in sandy clay soil at Saxmundham, Suffolk	155
KEATINGE, J. D. H., GARRETT, M. K. and STEWART, R. H. Response of perennial and Italian ryegrass cultivars to temperature and soil water potential	171

Continued on inside back cover

© Cambridge University Press 1980

SUBSCRIPTIONS. Two volumes of three parts are published annually. The subscription price of volumes 94 and 95, 1980, is £32.50 net (U.S.A. and Canada US \$94.25) per volume (post free); single parts are available at £13.00 net (U.S.A. and Canada US \$40.00) plus postage. Orders or enquiries may be sent to any bookseller or subscription agent, or to Cambridge University Press, P.O. Box 110, Cambridge CB2 3RL (U.S.A. and Canada, Cambridge University Press, 32 East 57th Street, New York, N.Y. 10022, U.S.A.).

Printed in Great Britain at the University Press, Cambridge