# The Journal of **Agricultural Science**

SENIOR EDITOR W. J. Whittington EDITORIAL ASSISTANT N. M. Boston

Journal of Agricultural Science, University of Nottingham, School of Agriculture, Sutton Bonington, Loughborough, Leicestershire LE12 5RD

#### EDITORIAL BOARD

E. J. Allen University of Cambridge, UK

B. W. Bache

University of Cambridge, UK J. Davis

Plant Breeding International, Cambridge, UK

W. Day Silsoe Research Institute, UK

R. H. Ellis University of Reading, UK

M. F. Fuller Rowett Research Institute, Aberdeen, UK

K. E. Giller Wye College, UK

J. C. Gower University of Leiden, The Netherlands J. R. Hillman

Scottish Crop Research Institute, Dundee, UK

A. E. Johnston

AFRC Institute of Arable Crops Research. Rothamsted, UK

R. N. B. Kay Aberdeen, UK

C. N. Law

Cambridge Laboratory, JI Centre for Plant Science Research, Norwich, UK

R. W. Matthewman Centre for Tropical Veterinary Medicine, University of Edinburgh, UK

T. R. Morris University of Reading, UK

J. B. Owen University College of North Wales, Bangor, UK

M. Peaker Hannah Research Institute, Ayr, UK C. J. Pollock Welsh Plant Breeding Station, Aberystwyth, UK

D. A. Preece University of Kent, Canterbury, UK

T. J. Riggs Horticulture Research International. Wellesbourne, UK

P. E. Russell Chesterford Park Research Station. Saffron Walden, UK

R. K. Scott University of Nottingham, Sutton Bonington, UK

D. E. Walters University of Cambridge, UK

D. Wilman University College of Wales, Aberystwyth, UK

#### INTERNATIONAL CONSULTANTS

P. Day Rutgers University of New Jersey, New Brunswick, USA

D. B. Lindsay Tropical Cattle Research Centre, Rockhampton, Australia

G. M. O. Maloiy University of Nairobi, Kenya

J. L. Monteith International Crops Research Institute, Patancheru, India

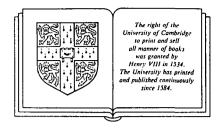
S. K. Sinha Indian Agricultural Research Institute, New Delhi, India

VOLUME 118

#### CAMBRIDGE UNIVERSITY PRESS

Cambridge

New York Port Chester Melbourne Sydney 1992



# PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE

The Pitt Building, Trumpington Street, Cambridge CB2 1RP 40 West 20th Street, New York, NY 10011-4211, USA 10 Stamford Road, Oakleigh, Victoria 3166, Australia

© Cambridge University Press 1992

Printed in Great Britain by the University Press, Cambridge

# **CONTENTS**

### PART I (FEBRUARY 1992)

Instructions to Authors	PAGE
REVIEW TOPPS, J. H. Potential, composition and use of legume shrubs and trees as fodders for livestock in the tropics	1
CROPS AND SOILS	
LECKIE, D. AND SNAPE, J. W. The location and effects of genes modifying the response of wheat to the herbicide difenzoquat	9
BOATMAN, N. D. Effects of herbicide use, fungicide use and position in the field on the yield and yield components of spring barley	17
BLUM, A., GOLAN, G., MAYER, J., SINMENA, B. AND OBILANA, T. Comparative productivity and	
drought response of semi-tropical hybrids and open-pollinated varieties of sorghum WILMAN, D., WALTERS, R. J. K., BAKER, D. H. AND WILLIAMS, S. P. Comparison of two varieties of	29
Italian ryegrass ( <i>Lolium multiflorum</i> ) for milk production, when fed as silage and when grazed FUJITA, H. AND HUMPHREYS, L. R. Variation in seasonal stocking rate and the dynamics of <i>Lotononis</i>	37
bainesii in Digitaria decumbens pastures	47
FIRMAN, D. M., O'BRIEN, P. J. AND ALLEN, E. J. Predicting the emergence of potato sprouts	55
LEVETT, M. P. Effects of various hand-weeding programmes on yield and components of yield of sweet potato ( <i>Ipomoea batatas</i> ) grown in the tropical lowlands of Papua New Guinea	63
SINGH, D., BRAR, M. S. AND BRAR, A. S. Critical concentrations of potassium in cotton (Gossypium hirsutum)	71
HOGMIRE, H. W., WIMMER, M. J., CRIM, V. L., WELKER, R. M., WENTZ, E. AND SMITH, R. R. Influence of tree growth on spray chemical deposits on peach leaves	77
POWLSON, D. S., HART, P. B. S., POULTON, P. R., JOHNSTON, A. E. AND JENKINSON, D. S. Influence of soil type, crop management and weather on the recovery of <sup>15</sup> N-labelled fertilizer applied to	
winter wheat in spring	83
ADDISCOTT, T. M. AND POWLSON, D. S. Partitioning losses of nitrogen fertilizer between leaching and denitrification	101
PAL, D., SEN, H. S., DASH, N. B. AND BANDYOPADHYAY, B. K. Moisture transport under cyclic trickle irrigations in different textured soils	109
ANIMALS	
FAICHNEY, G. J. Effect of non-uniform distribution of particle-associated markers on the measurement of duodenal digesta flow by the double-marker technique	119
GAILI, E. S. E. Breed and sex differences in body composition of sheep in relation to maturity and growth rate	121
McCRABB, G. J., EGAN, A. R. AND HOSKING, B. J. Maternal undernutrition during mid-pregnancy in sheep: variable effects on placental growth	
ARIF, M., JOSHI, K. L., SHAH, P., KUMAR, A. AND JOSHI, M. C. Hatchability of layers' eggs stored and	
incubated in different positions at 5500' altitude	133
BOOK REVIEWS	135

## PART 2 (APRIL 1992)

Instructions to Authors	PAGE
CROPS AND SOILS	
CULLIS, B. R., GLEESON, A. C. AND THOMSON, F. M. The response to selection of different procedures for the analysis of early generation variety trials	141
cousens, R. D., Johnson, M. P., Weaver, S. E., Martin, T. D. and Blair, A. M. Comparative rates of emergence and leaf appearance in wild oats (Avena fatua), winter barley (Hordeum sativum)	
and winter wheat (Triticum aestivum)	149
ECHEVERRÍA, H. E., NAVARRO, C. A. AND ANDRADE, F. H. Nitrogen nutrition of wheat following different crops	157
CAPPER, B. S., SAGE, G., HANSON, P. R. AND ADAMSON, A. H. Influence of variety, row type and time of sowing on the morphology, chemical composition and <i>in vitro</i> digestibility of barley straw	165
EVANS, D. R., WILLIAMS, T. A. AND MASON, S. A. Residual N effect of grazed white clover ( <i>Trifolium repens</i> )/ryegrass ( <i>Lolium perenne</i> ) swards on subsequent yields of spring barley	175
SHARMA, A. R. AND REDDY, M. D. Optimum sowing date and nitrogen fertilizer rate for rice varieties under intermediate deepwater conditions (15-50 cm)	179
ALLEN, E. J., O'BRIEN, P. J. AND FIRMAN, D. An evaluation of small seed for ware-potato production	185
AWETO, A. O., OBE, O. AND AYANNIYI, O. O. Effects of shifting and continuous cultivation of cassava (Manihot esculenta) intercropped with maize (Zea mays) on a forest alfisol in south-western	
Nigeria	195
ALLISON, M. F., JAGGARD, K. W. AND LAST, P. J. Effects of straw incorporation on the yield, nitrogen fertilizer and insecticide requirements of sugarbeet ( <i>Beta vulgaris</i> )	199
GIARDINI, L., PIMPINI, F., BORIN, M. AND GIANQUINTO, G. Effects of poultry manure and mineral fertilizers on the yield of crops	207
PIMPINI, F., GIARDINI, L., BORIN, M. AND GIANQUINTO, G. Effects of poultry manure and mineral fertilizers on the quality of crops	215
IQBAL, M. M. Potential rates of denitrification in two field soils in southern England	223
ANIMALS	
PUNIA, B. S., LEIBHOLZ, J. AND FAICHNEY, G. J. Rate of production of protozoa in the rumen and	
the flow of protozoal nitrogen to the duodenum in sheep and cattle given a pelleted diet of lucerne hay and barley	229
WILLIAMS, M. E. AND McLEOD, B. J. Strategic milk progesterone testing for the detection of silent oestrus and anovulation in dairy cows	237
COBON, D. H. AND O'SULLIVAN, B. M. Effect of <i>Haemonchus contortus</i> on productivity of ewes, lambs and weaners in a semi-arid environment	245
PHILLIP, L. E. AND SIMPSON, M. V. Differentiation of the effects of protein status and acid-base	
balance on the appetite of sheep for lucerne silage	249
DOOK DEVIEWS	259

## PART 3 (JUNE 1992)

Instructions to Authors	PAGE
CROPS AND SOILS	
SAJO, A. A., SCARISBRICK, D. H. AND CLEWER, A. G. Effect of rates and timing of nitrogen fertilizer on the grain protein content of wheat ( <i>Triticum aestivum</i> ), grown in two contrasting seasons in South East England	265
KIRBY, E. J. M. A field study of the number of main shoot leaves in wheat in relation to vernalization and photoperiod	271
CONRY, M. J. AND HEGARTY, A. Effect of sowing date and seed rate on the grain yield and protein content of winter barley	279
O'BRIEN, P. J. AND ALLEN, E. J. Effects of date of planting, date of harvesting and seed rate on yield of seed potato crops	289
TOMMEY, A. M. AND EVANS, E. J. Analysis of post-flowering compensatory growth in winter oilseed rape ( <i>Brassica napus</i> )	301
KALRA, A., PARAMESWARAN, T. N. AND RAVINDRA, N. S. Influence of planting date on plant losses and yield responses of geranium ( <i>Pelargonium graveolens</i> ) to root rot and wilt NEMEC, S. <i>Glomus intraradix</i> effects on citrus rootstock seedling growth in various potting media	309 315
SILIM, S. N. AND SAXENA, M. C. Comparative performance of some faba bean ( <i>Vicia faba</i> ) cultivars of contrasting plant types. 1. Yield, yield components and nitrogen fixation	325
SILIM, S. N. AND SAXENA, M. C. Comparative performance of some faba bean ( <i>Vicia faba</i> ) cultivars of contrasting plant types. 2. Growth and development in relation to yield	333
STÜTZEL, H. AND AUFHAMMER, W. Grain yield in determinate and indeterminate cultivars of <i>Vicia faba</i> with different plant distribution patterns and population densities	343
ANIMALS	
ATAJA, A. M., WILSON, P. R., BARRY, T. N., HODGSON, J., HOSKINSON, R. M., PARKER, W. J. AND PURCHAS, R. W. Early venison production from red deer ( <i>Cervus elaphus</i> ) as affected by grazing perennial or annual ryegrass pastures, pasture surface height and immunization against melatonin	353
ATAJA, A. M., BARRY, T. N., HOSKINSON, R. M. AND WILSON, P. R. Effects of active immunization against LHRH and melatonin on growth and plasma hormone concentrations in red deer stags	
during their second year  PHIPPS, R. H., WELLER, R. F. AND ROOK, A. J. Forage mixtures for dairy cows: the effect on dry matter intake and milk production of incorporating different proportions of maize silage into diets	371
based on grass silages of differing energy value  PARKER, W. J. AND McCUTCHEON, S. N. Effect of sward height on herbage intake and production	379
of ewes of different rearing rank during lactation	383
ABSTRACTS Modelling Approaches to the Control of Agricultural Pollution	397
BOOK REVIEWS	401
INDEX	407

Copying. No contents may be reproduced by any means without the permission of Cambridge University Press. This journal is registered with the Copyright Clearance Center. 27 Congress Street, Salem, MA 01970. Organizations in the USA who are also registered with the C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of \$5.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0021–8596/92 \$5.00+0.00.

ISI Tear Sheet Service. 3501 Market Street, Philadelphia, PA 19106, USA, is authorized to supply single copies of separate articles for private use only.

For all other use, permission should be sought from Cambridge or the American Branch of Cambridge University Press.

#### **CAMBRIDGE UNIVERSITY PRESS**

The Pitt Building, Trumpington Street, Cambridge CB2 1RP 40 West 20th Street, New York, NY 10011-4211, USA 10 Stamford Road, Oakleigh, Victoria 3166, Australia

Printed in Great Britain by the University Press, Cambridge

# The Journal of Agricultural Science

VOLUME 118 PART 3 JUNE 1992

CONTENTS	
Instructions to Authors	PAGE
Instructions to Authors  CROPS AND SOILS  SAJO, A. A., SCARISBRICK, D. H. and CLEWER, A. G. Effect of rates and timing on itrogen fertilizer on the grain protein content of wheat (Triticum aestivum), grown in two contrasting seasons in South East England  KIRBY, E. J. M. A field study of the number of main shoot leaves in wheat in relation to vernalization and photoperiod  CONRY, M. J. and HEGARTY, A. Effect of sowing date and seed rate on the grain yield and protein content of winter barley  O'BRIEN, P. J. and Allen, E. J. Effects of date of planting, date of harvesting and seed rate on yield of seed potato crops  TOMMEY, A. M. and EVANS, E. J. Analysis of post-flowering compensatory growth in winter oilseed rape (Brassica napus)  KALRA, A., PARAMESWARAN, T. N. and RAVINDRA, N. S. Influence of planting date on plant losses and yield responses of geranium (Pelargonium graveolens) to root ro and wilt  NEMEC, S. Glomus intraradix effects on citrus rootstock seedling growth in various pot ting media  SILIM, S. N. and SAXENA, M. C. Comparative performance of some faba bear (Vicia faba) cultivars of contrasting plant types. 1. Yield, yield components and nitrogen fixation  SILIM, S. N. and SAXENA, M. C. Comparative performance of some faba bear (Vicia faba) cultivars of contrasting plant types. 2. Growth development in relation to yield  STÜTZEL, H. and AUFHAMMER, W. Grain yield in determinate and indeterminate cultivars of Vicia faba with different plant distribution patterns and population densities	265 271 1 279 1 289 1 301 2 309 3 315 1 325
ANIMALS  ATAJA, A. M., WILSON, P. R., BARRY, T. N., HODGSON, J., HOSKINSON, R. M. PARKER, W. J. and PURCHAS, R. W. Early venison production from red dee (Cervus elaphus) as affected by grazing perennial or annual ryegrass pastures, pasture surface height and immunization against melatonin  ATAJA, A. M., BARRY, T. N., HOSKINSON, R. M. and WILSON, P. R. Effects of active immunization against LHRH and melatonin on growth and plasma hormone concentrations in red deer stags during their second year  PHIPPS, R. H., WELLER, R. F. and ROOK, A. J. Forage mixtures for dairy cows: the effect on dry matter intake and milk production of incorporating different proportions of maize silage into diets based on grass silages of differing energy value  PARKER, W. J. and Mccutcheon, S. N. Effect of sward height on herbage intake and production of ewes of different rearing rank during lactation	353
ABSTRACTS Modelling Approaches to the Control of Agricultural Pollution	397
BOOK REVIEWS	401
INDEX	407