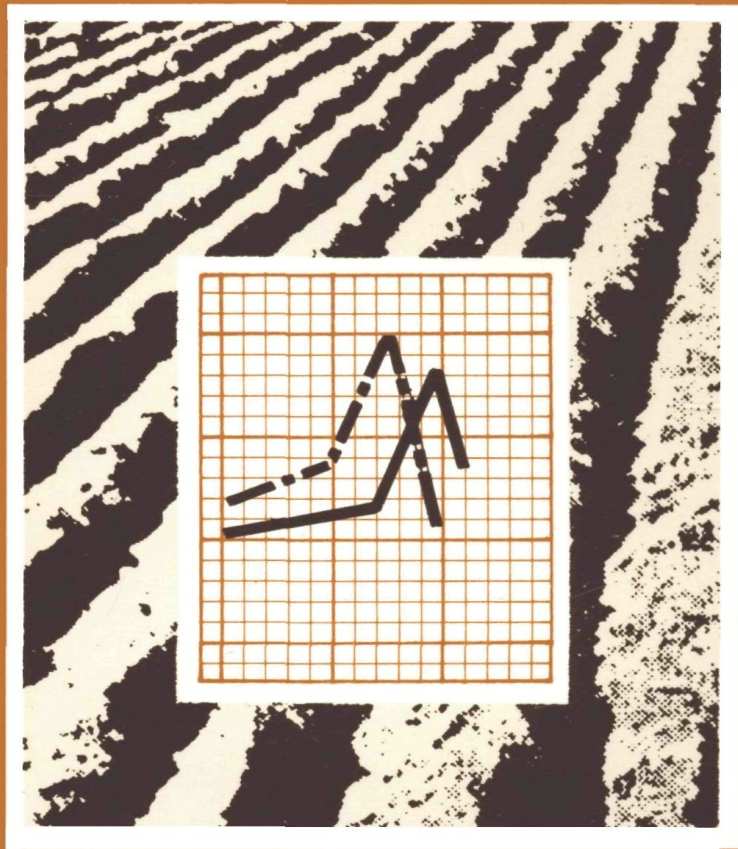


VOLUME 116 PART 1 FEBRUARY 1991

---

# The Journal of Agricultural Science

---



CAMBRIDGE UNIVERSITY PRESS

# The Journal of Agricultural Science

SENIOR EDITOR      EDITORIAL ASSISTANT

W. J. Whittington      N. 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*

R. B. Austin  
*Cambridge, UK*

B. W. Bache  
*University of Cambridge, UK*

Sir James Beament  
*Queens' College,  
Cambridge, UK*

Sir Kenneth Blaxter  
*Stradbroke, UK*

J. Davis  
*Plant Breeding  
International, Cambridge,  
UK*

W. Day  
*AFRC Institute of  
Engineering Research,  
Silsoe, UK*

S. K. Eltringham  
*University of Cambridge, UK*

J. C. Gower  
*University of Leiden,  
The Netherlands*

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*

T. R. Morris  
*University of Reading, UK*

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

M. Peaker  
*Hannah Research  
Institute, Ayr, UK*

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

T. J. Riggs  
*AFRC Institute of  
Horticultural Research,  
Wellesbourne, UK*

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

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

D. Wilman  
*University College of  
Wales, Aberystwyth, UK*

## INTERNATIONAL CONSULTANTS

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

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

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

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

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

**Subscriptions.** *The Journal of Agricultural Science* is published annually in two volumes of three parts. All orders must be accompanied by payment. The subscription price for 1991, volumes 116 and 117, is £175.00 in UK, £184 elsewhere net (USA and Canada US \$341) per volume (post free); single parts are available at £31 net (USA and Canada US \$59) plus postage. Orders or enquiries may be sent to any bookseller or subscription agent, or to the publisher: Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU (USA and Canada, Cambridge University Press, Journals Department, 40 West 20th Street, New York, NY 10011-4211, USA). Second class postage paid at New York, NY, and at additional mailing offices. POSTMASTER: send address changes in USA and Canada to *The Journal of Agricultural Science*, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573-19864.

© Cambridge University Press 1991

## Notice

At the end of 1990, the editorial office of the *Journal of Agricultural Science* moved to the School of Agriculture, University of Nottingham. Contributions to the Journal should be addressed to the new Senior Editor: Professor W. J. Whittington, Journal of Agricultural Science, University of Nottingham, School of Agriculture, Sutton Bonington, Loughborough, Leicestershire LE12 5RD.

### Instructions to Authors

*Failure to comply with the Instructions to Authors may delay publication*

The Journal welcomes concise papers reporting original experimental data or experimental methods, or new analyses of existing data, in any aspect of Agricultural Science. Work based on limited experimentation (e.g. the results of a single experiment or season) will not generally be considered acceptable. Work of largely local interest is not considered appropriate for an international journal. The Editors must be informed if any of the material submitted has been published elsewhere. If a paper is accepted, it must not be published elsewhere in the same form. Experiments on animals must conform with legislation in the country where the experiments are carried out. Papers should be submitted to the Editorial Assistant, Journal of Agricultural Science, University of Nottingham, School of Agriculture, Sutton Bonington, Loughborough, Leicestershire LE12 5RD.

**Scripts.** Papers, written in English, should be typed in double spacing on one side of the paper with a margin of at least 4 cm on the left-hand side. Sheets should be numbered consecutively. Two copies should be submitted.

**Layout and style.** Authors are recommended to use the style adopted in recent issues. A simple direct style of writing, avoiding unnecessary repetition and circumlocution, is preferred. Spelling should conform to the *Concise Oxford Dictionary*.

**Title page.** The title should be informative but concise and should not contain abbreviations. It should name the organism studied, where relevant. Authorities for Latin names should not be given in the title, but may be given at first mention in the text. Authors should give surnames and full initials. The full name and address of the institution where the research was done should be stated. Change of address may be given as a footnote. A short title, not exceeding 50 characters, should be provided for the running headlines. Indicate at the foot of the

page the name and address to which proofs should be sent.

**A summary**, placed at the beginning of the text, should briefly indicate the experiments described (including year and place, as appropriate), the main result and important conclusions. It should not repeat information given in the title.

**Text.** It is usually convenient to divide the paper into sections, e.g. Introduction, Materials and Methods, Results, and Discussion. Too many headings and subheadings should be avoided. The Introduction should set the work in context, present only essential background, and include a concise statement of the objectives; a detailed review of literature is not necessary. Relevant details should be given of the experimental materials and design, and the techniques and statistical methods used. Statistical guidelines are available on request. Numerical results should be shown in Tables and not repeated in the text. Metric units should be used (see *Units, Symbols, and Abbreviations*. London: Royal Society of Medicine Services). Experimental details and Results should be recorded in the past tense. The Discussion should briefly relate the author's results to other work on the subject and give the author's conclusions. Footnotes should not be used. All abbreviations used should be fully explained at first mention.

**Tables** must be typed on separate sheets, numbered consecutively and carry an appropriate title. The approximate position of each should be noted in the margin of the MS. Numerical results should be displayed as means with their relevant standard errors. Normally a mean should be rounded to one-tenth of its standard error and the standard error given to one place of decimals more than the mean. It is important that the Tables and Figures be readily understood without reference to the text; they should not contain unexplained abbreviations.

**Figures** should be restricted to the display of results when a large number of values can be comprehended more easily; Tables and Figures may not reproduce the same data. Line drawings should be 25 cm wide and drawn in black waterproof ink on Bristol Board, graph paper with faint blue lines or tracing paper. Numbering and lettering, which must be kept to an absolute minimum, should be legibly inserted on copies, not on the originals. Vertical axes should be labelled vertically. A full legend describing the Figure and giving a key to all the symbols on it should be typed on a separate sheet. The symbols preferred are ● ○ ■ □ ▲ and △, but + and × should be avoided.

**Plates** may be accepted, but only if they make a definite contribution to the value of the paper. They should be good quality, unmounted, glossy prints and be lightly numbered in pencil on the reverse side. They should be numbered as part of the sequence of figures. If several plates or coloured photographs are submitted the author may be asked to contribute to the cost of reproducing them.

**References.** In the text, a reference should be quoted by the author's name and date in parentheses, in date order, e.g. (Smith 1983; Jones & Jones 1985; Smith 1986*a, b*). Where there are three or more authors, the first name followed by *et al.* should be used. A list of References should be given at the end of the text listing, in alphabetical order, surname of authors and initials (in capitals), year of publication (in parentheses), title of paper, name of journal in full (underlined to denote italics) as in *CAB International Serials Checklist*, volume, and first and last pages of the reference; include place of publication and publisher (and Editor(s) if appropriate) for books and conferences, e.g.

In text:

Smith (1984); Smith (1985*a, b*); Smith & Jones (1968); (Bloggs 1988); (Smith 1985; Bloggs 1987, 1988; Fisher 1989); Smith (in press); (Smith, in press); A. B. Smith (unpublished); (A. B. Smith, unpublished)

In Reference list:

- GRAY, D., TUCKWELL, M. E. & HARGREAVES, G. (1979). Timing of harvests in summer lettuce: comparison of sowing methods. *Experimental Horticulture* **49**, 141–149.
- STEEN, E. (1983). The net stocking method for studying quantitative and qualitative variation with time of grass roots. In *Root Ecology and its Practical Applications* (Eds W. Böhm, L. Kutschera & E. Lichtenegger), pp. 63–74. Gumpenstein, Irdning: Bundesanstalt für alpenländische Landwirtschaft.
- SAXENA, M. C. & SINGH, K. B. (Eds) (1987). *The Chickpea*. Wallingford: CAB International.
- GREENWOOD, D. S. (1986). *A study of the effects of bullfinches in apple orchards in Kent*. PhD thesis, University of Canterbury.
- SMITH, A. B. (1982). Resistance of *Capsicum* to storage rots. In *Proceedings of the Society of Food Transporters* (Ed. R. Jones), pp. 72–89. Cambridge: Cambridge University Press.
- SMITH, A. B. (in press). Birds feeding in cereal fields. *Journal of Agricultural Science, Cambridge*.

Authors should check that all references in the text appear at the end of the paper and vice versa, and that names and dates correspond in the two places.

**Series.** The Editors do not wish to publish continuing series and will accept work divided into parts only if they consider it of advantage to the readers; the whole work must be submitted at the same time. In general the first part must include in the Introduction the reasons for carrying out the whole work and the final part must end with a Discussion of all the findings to show the progress made.

**Mathematical models.** Authors preparing papers involving complex mathematical models are advised to obtain, from the above address, notes setting out the Editors' policy on these models.

**Proofs** will be sent to authors to enable them to check the correctness of the typesetting. Excessive alterations due to amendments of the author's original agreed copy may be charged to the author.

**Offprints.** Contributors will receive 25 copies of their papers free and can order others when they receive the proofs.

**Books for review.** Books should be sent to the Review Editor, W. J. Ridgman, 1 Hillside Lane, Arrington, Royston, Herts, SG8 0DA.