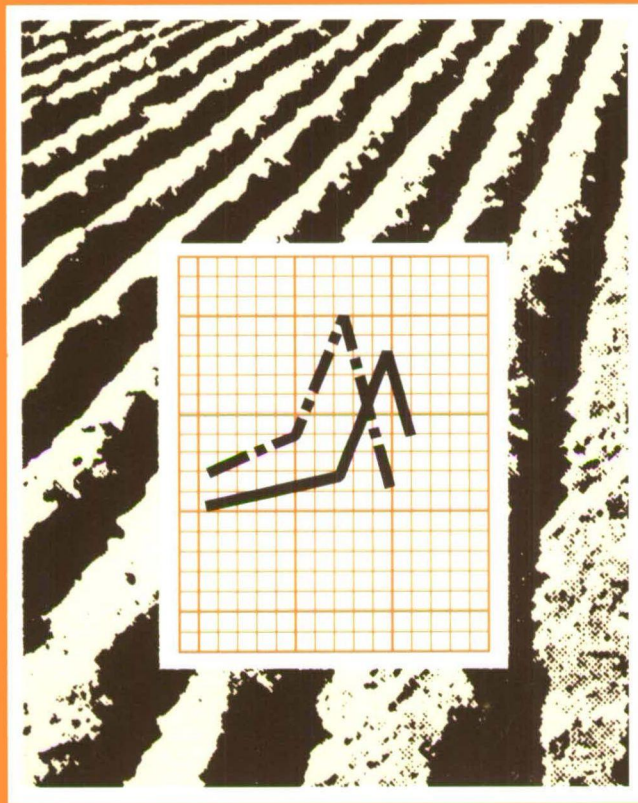


VOLUME 123 PART 3 DECEMBER 1994

---

# The Journal of Agricultural Science

---



CAMBRIDGE UNIVERSITY PRESS

# The Journal of Agricultural Science

SENIOR EDITOR

W. J. Whittington

EXECUTIVE EDITOR

N. M. Boston

*Journal of Agricultural Science, University of Nottingham, Faculty of Agricultural and Food Sciences, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK*

## EDITORIAL BOARD

E. J. Allen  
*University of Cambridge, UK*

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

W. Day  
*Silsoe Research Institute, UK*

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

M. D. Gale  
*Cambridge Laboratory,  
JI Centre, Norwich, UK*

K. E. Giller  
*Wye College, UK*

J. C. Gower  
*Wheatthampstead, UK*

J. F. D. Greenhalgh  
*Conwy, UK*

A. E. Johnston  
*Institute of Arable  
Crops Research,  
Rothamsted, UK*

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

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

R. A. Kempton  
*Scottish Agricultural Statistics  
Service, University of  
Edinburgh, UK*

T. Lewis  
*Institute of Arable  
Crops Research,  
Rothamsted, UK*

D. B. Lindsay  
*Cambridge, UK*

J. S. Macfarlane  
*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*

C. J. Pollock  
*Institute of Grassland and  
Environmental Research,  
Aberystwyth, UK*

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

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

P. E. Russell  
*AgrEvo UK Limited,  
Chesterford Park,  
Saffron Walden, UK*

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

R. Thompson  
*Roslin Institute  
(Edinburgh), UK*

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

## INTERNATIONAL CONSULTANTS

W. Erskine  
*ICARDA,  
Aleppo, Syria*

J. H. Topps  
*University of Zimbabwe,  
Harare, Zimbabwe*

G. M. O. Maloiy  
*Institute of Animal Physiology  
and Biotechnology Research,  
Nairobi, Kenya*

**Subscriptions.** The subscription price (excluding VAT) for 1994, volumes 122 and 123, is £218.00 net (USA, Canada and Mexico US \$410) post free; single parts are available at £38 net (USA, Canada and Mexico US \$70) plus postage. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. *The Journal of Agricultural Science* is published annually in two volumes of three parts. All orders must be accompanied by payment. 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). Japanese prices for institutions (including ASP delivery) are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo. Second class postage paid at New York, NY, and at additional mailing offices. POSTMASTER: send address changes in USA, Canada and Mexico to *The Journal of Agricultural Science*, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573-4930.

# Instructions to Authors

**The Journal** welcomes concise papers presenting original research data or methodology from authors throughout the world. The Editors wish to continue the policy of the Journal, since its foundation in 1905, of publishing papers in all aspects of Agricultural Science and reflecting the considerable and continuing changes in agriculture. Plant and Crop Science, Crop Protection, Soil Science, Animal Science, Environmental Science and the relationships between them are covered. The Editors also welcome papers relating new scientific technology or concepts in such fields as genetics, biochemistry, biophysics and molecular biology to agricultural practice. In addition, the Journal publishes critical reviews from time to time, normally by invitation, on topics of interest to its readership.

**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 to the legislation in the country where the experiments were carried out. Work based on limited experimentation will not generally be considered acceptable. Work of local interest only is not considered appropriate for an international journal.

**Papers should be submitted** to the Executive Editor, University of Nottingham, Faculty of Agricultural and Food Sciences, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK. The Editorial Office is always pleased to offer help and advice to potential authors.

**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 advised to use the format adopted in recent issues. A simple direct style of writing 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 full initials and surnames. 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 results and most important conclusions. It should not repeat the wording of 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 the 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 the tables and not repeated in the text. Metric and SI units should be used. Experimental details and Results should be recorded in the past tense with an indication of their significance. 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 in the same order as they are mentioned in the text. Numerical results should be displayed as means with their relevant standard errors and degrees of freedom. 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. The title should fully describe the contents of the Table and explain any abbreviations used in it.

**Figures** should be restricted to the display of results where a large number of values are presented and interpretation would be more difficult in a Table. Figures may not reproduce the same data as Tables. Originals of Figures should preferably be A4 size, of good quality, drawn or printed clearly in black on plain white paper, graph paper with faint blue lines or tracing paper. There should be no numbering or lettering on the originals. Numbering and lettering, which must be kept to an absolute minimum, should be legibly inserted on the copies. 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 authors 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; the place of publication and publisher (and Editor(s) if appropriate) for books and conferences should be included, 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:

- DABNEY, S. M., BREITENBECK, G. A., GRIFFIN, J. L. & HOFF, B. J. (1989). Subterranean clover cover crop used to increase rice yield. *Agronomy Journal* **81**, 483–487.
- FIRMAN, D. M. (1987). *Leaf growth and senescence of the potato*. PhD thesis, University of Cambridge.
- JONES, L. (1990). White clover understorey as a supply of nitrogen to cereals. In *Proceedings of the 13th General Meeting of the European Grassland Federation, Volume 1* (Eds N. Gáborčík, V. Krajčovič & M. Zimkova), pp. 154–158. Banksá Bystrica, Czechoslovakia: Grassland Research Institute.
- KIRBY, E. J. M. & APPEYARD, M. (1984). Cereal development and its relation to crop management. In *Cereal Production* (Ed. E. J. Gallagher), pp. 161–173. London: Butterworths.
- SAXENA, M. C. & SINGH, K. B. (Eds) (1987). *The Chickpea*. Wallingford: CAB International.
- 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 the 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 Editorial Office, 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 Executive Editor, Journal of Agricultural Science, University of Nottingham, Faculty of Agricultural and Food Sciences, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK.