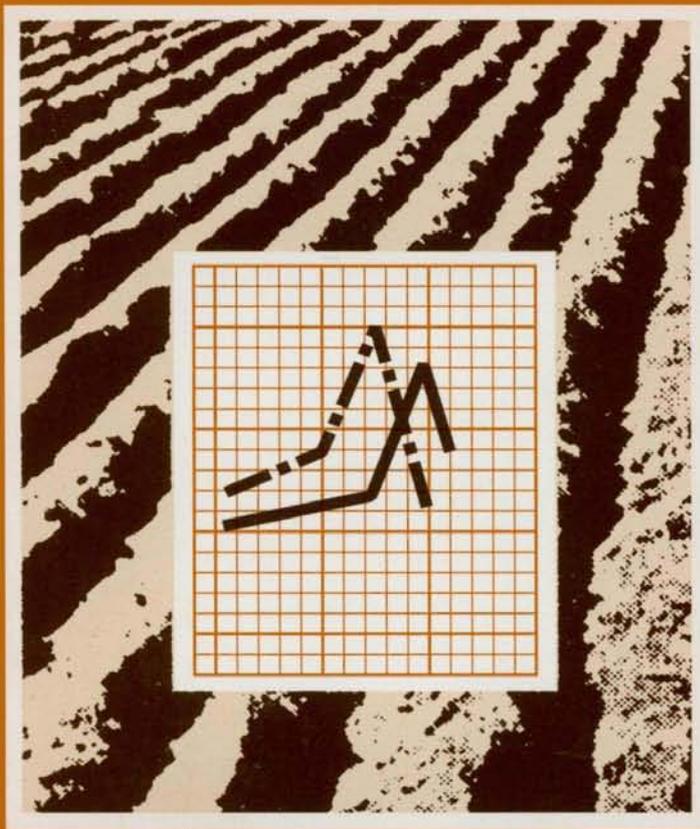


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The Editors must be informed if any of the material submitted has been published elsewhere. If a paper is accepted, it must not be published elsewhere in the same form. Experiments on animals must conform to the legislation in the country where the 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.

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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.

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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.

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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 I* (Eds N. Gáborčík, V. Krajčovič & M. Zimkova), pp. 154–158. Banksá Bystrica, Czechoslovakia: Grassland Research Institute.
- KIRBY, E. J. M. & APPELYARD, 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*.

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