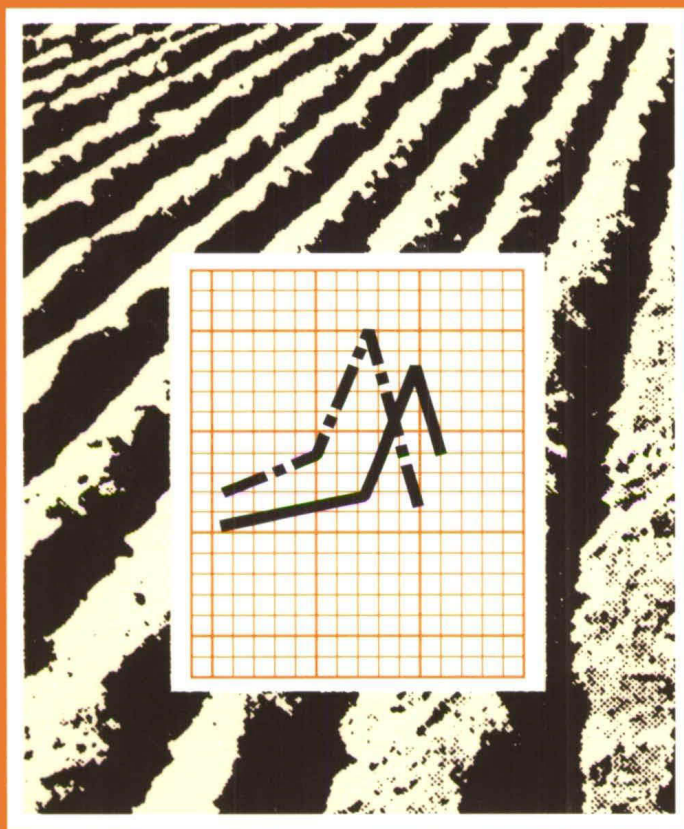


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In Reference list:

- 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. & APPLEYARD, 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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