

issues that need to be given utmost importance in the years to come in order to have sustainable rice production to meet the growing population demand in the next century.

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P11 S0378-3774(96)01280-2

Crop-Water-Simulation Models in Practice, Selected Papers of the 2nd Workshop on Crop-Water-Models held at the Occasion of the 15th Congress of the International Commission on Irrigation and Drainage (ICID), The Hague, The Netherlands, 1993. L.S. Pereira, B.J. van den Broek, P. Kabat and R.G. Allen (Editors). Wageningen Pers, Wageningen, The Netherlands, 1995, 339 pp., Dfl.218 (hardbound), ISBN 90-74134-26-2.

This book contains 18 papers organized into three sections: (1) six papers on soil water balance models for irrigation scheduling; (2) seven papers on crop growth and water balance simulation, mostly applied to irrigation and drainage problems; (3) five papers concerning simulation of irrigation systems, emphasizing system management and design on a scale larger than individual fields. One criterion for inclusion of the papers in this book was that the models had been calibrated and validated against field data. Such model testing was limited or absent in some cases. The second criterion for inclusion was that models were 'operational', i.e. that users 'have access to and can rely on existing software'. This was true of most but not all of the models presented. The editors make an excellent suggestion that 'users should verify and, when necessary, adapt models to correspond to their own unique conditions'. However, source code is not available for some of these models—seemingly an unfortunate consequence of the recent decisions of some institutions to attempt to derive income from computer programs written with the support of taxpayer funds. Non-release of source code is an anti-scientific trend that should be resisted.

The hardbound book presents a good mixture of work by mostly European and US authors but the applications are world wide. Some of these are new applications or revisions of older models. Others are recent applications of older models, such as the use of CERES-Millet to predict yield and soil water balance in Niger, or the use of SWATRE for prediction of drainage and salinization of irrigated fields in Pakistan. In most cases, the testing results and discussion are substantial enough to give good insight into the relative strengths of the various codes. The 18 papers present a broad view of modeling goals and strategies from the very specific and somewhat limited to models intended for general use under widely disparate conditions. There is also some discussion of differing philosophies and strategies aimed at similar goals. One example is the contrast of soil water balance models based on numerical solutions of the Richards

equation with those based on Green-Ampt infiltration and a single or few soil layers which drain only when wetted to field capacity. Similarly, methods of computing reference evapotranspiration (ET) range from Priestly-Taylor to Penman-Monteith to Jensen-Haise formulations, and methods of computing crop ET range from using a reference ET and a crop coefficient to more physically based solutions depending on surface energy balances and direct estimation of crop and aerodynamic resistances. Some models offer the use of several alternative ET estimation methods.

None of the papers presents a complete description of the subject computer program, something that is impossible in a single paper about any substantial code, but most give a good view of the main governing equations and the tradeoffs and simplifying assumptions made in formulating the code. Also, most of the work is as near state-of-the-art as one is likely to find. All papers end with reference lists, some extensive. The main text is followed by a useful appendix listing the surface mail addresses, but unfortunately neither phone numbers nor e-mail addresses, of all the authors. The book will be a useful addition to the library of any professional concerned with irrigation scheduling; simulation of crop growth, yield and field water balance; or irrigation system management and design on a large scale. Although the applications mostly focus on irrigation problems, many of the models in the second section are applicable to dryland farming as well, and thus the book will have interest for those interested in crop growth and water balance under rain-fed conditions.

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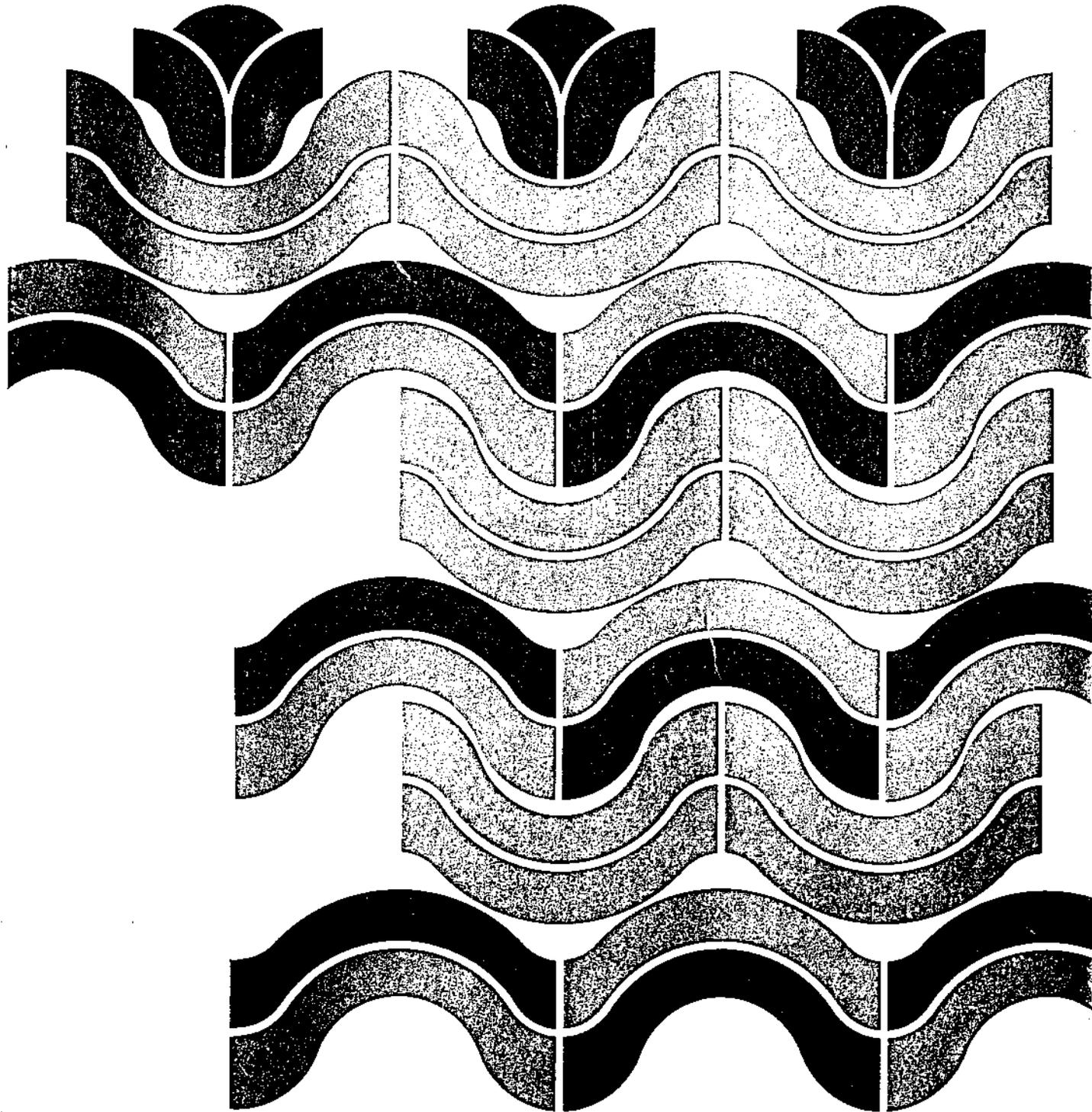
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