Book review

Bernhard Hau, 1985. Epidemiologische Simulatoren als Instrumente der Systemanalyse mit besonderer Berücksichtigung eines Modells des Gerstenmehltaus. Acta Phytomedica 9. ISBN 3-489-60726-0. 101 pp. Verlag Paul Parey, Berlin and Hamburg.

This is the third epidemiological study which is published as a supplement to the Phytopathologische Zeitschrift. All studies were done by members of the well known group of Professor J. Kranz at the University of Giessen, Federal Republic of Germany. The first study (Analytis, S., 1973. Acta Phytomedica 1, 76 pp.) concerns the statistical analysis of a plant disease epidemic, the second one (Aust, H.J., 1981. Acta Phytomedica 7, 76 pp.) concerns the detailed analysis of the relations of disease parameters with field experiments and laboratory studies. In this study a simulation model of an epidemic of powdery mildew in barley (GEMETA) is presented and compared with other plant disease epidemic simulators.

In the construction of the model an overwhelming amount of experimental data is used. Data on the response of various characteristics of the life cycle of the fungus to different abiotic conditions have been introduced. The results of the model are compared with field experiments of seven years. The overall performance of the model is good, except for two years. The author argues that the initialisation of the model in one year and the absence of adult plant resistance in the other year caused these differences.

The model is well explained and the amount of data needed to construct the simulator is impressive. Some parts of the life cycle of the fungus (e.g. the incubation period are wel documented and simply programmed whereas for other parts (e.g. the absolute sporulation rate) quantitative data are rare. In those cases complicated model structures seem to hide the lack of knowledge. This does cause some unbalance in the model but the author openly presents his assumptions.

In the comparison of his simulator with other plant disease simulators, viz. EPIDEM *(Alternaria solani),* EPIMAY *(Helminthosporium maydis),* EPIVEN *(Venturia inaequalis),* EPISIM *(Puccinia striiformis),* EPIDEMIC *(Puccinia striiformis),* EPISEPT *Septoria nodorum)* and BARSIM *(Puccinia hordei)* the author demonstrates the similarities between the various models. All are based on a quantitative description of the life cycles of the fungi under various conditions. However, the author does not show the weaknesses of some simulators, when elementary concepts of numerical integrations, such as time coefficients, are neglected. Unfortunately this omission holds also for GAMETA, which may explain part of the difference between simulator and field experiments. There is probably somewhat too much attention paid to fluctuating temperatures which are difficult to grasp because of the too big time step of integration that is used in the model. The sensitivity analysis of the model lacks the evaluation of these and other weak points in the model.

The whole book is well documented, and presents the model clearly. At some places the text may be overstructured but the detailed descriptions enable all epidemiologists to become familiar with the way the German research group in Giessen is constructing and evaluating its simulators of plant disease epidemics. It is therefore a must for those plant pathologists working on the population level of disease.

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