

BOOK REVIEW

The Study of Plant Disease Epidemics

By Laurence V. Madden, Gareth Hughes, and Frank van den Bosch

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The publication of “*The Study of Plant Disease Epidemics*” last year was highly anticipated amongst the plant disease epidemiology community world-wide and marks the latest major addition to general epidemiology texts. It builds upon the previous publication of the first author, “*Introduction to Plant Disease Epidemiology*” in 1990 and the late C. L. Campbell (to whom this new publication is deservedly dedicated). There is no doubt the content and tone of the publication has lived up to its expectations and more! In particular, this publication focuses on cohesively augmenting the literature with advancements in the discipline over the last 17 years.

“*The Study of Plant Disease Epidemics*” first examines the concepts used in plant disease epidemiology and reviews the historical developments of the discipline hinging upon the turning point of the discipline, the publication of “*Plant Diseases: Epidemics and Control*” by J.E. Vanderplank in 1963. Further subjects examined in this publication include measuring plant diseases (concepts, assessment using scales and disease area diagrams, remote-sensing, and issues associated with reliability, accuracy and agreement), introductory modeling including fitting of linear and nonlinear models to data, temporal analyses for quantifying and comparing epidemics and the use of models to incorporate crop growth and vector transmission, spatial analysis of epidemics including dispersal and disease gradients and disease spread, including ways to spatially analyse different data types, sampling issues associated with estimating plant disease intensity, the use of decision making tools such as operating characteristic curves in plant disease management, and modeling concepts associated with epidemics and crop yield. Particularly welcome inclusions within this publication are detailed sections on subjects which have become increasingly popular within the last few years, including:

- 1) the H – I - R (Healthy – Infectious – Removed) and H – L – I – R (Healthy – Infectious – Latent – Removed) model concepts, including information in especially designated boxes on the derivation of these differential equations for estimation of a range of parameter values;

- 2) Latest concepts and techniques to describe spatial and spatio-temporal patterns of epidemics, such as Spatial Analysis by Distance IndicEs (SADIE), of which section III (Patterns of Plant Disease) is conveniently sectioned based on data type available (e.g. sparsely sampled incidence, count, and severity data, and analysis of intensively mapped data) and then further defined by stochastic simulation models and distance-based methods.
- 3) Decision making including operating characteristic curves and risk algorithms.

There is no doubt this publication is not for the mathematically faint-hearted! However, those with an interest in this discipline will concur that the use of mathematics and statistical models to describe epidemics is clearly essential, and the author's have presented this material in a non-confrontational manner. A welcome addition to this publication is transfer of the theoretical concepts to practical reality with the inclusion of SAS input and output files examples for various procedures (including detailed explanation within the text). Other "practical" venues for plant disease epidemiology include the publication by Francl and Neher (1997) entitled "*Exercises in Plant Disease Epidemiology*", and the series of plant disease epidemiology workshops held in conjunction with the American Phytopathological Society Meetings annually. However, rarely do we see an example of an efficient marriage of theoretical derivation of concepts and practical analysis of "real" data.

Each chapter also contains citations of selected literature for each concept and a list of suggested readings at their conclusion. This makes navigating the extensive web of epidemiological literature considerably easier, and therefore the publication is a key starting point for those just starting to immerse themselves in this discipline.

There have been several similar additions (books and edited books) to the plant disease epidemiology literature published since 2000 (e.g. '*The Epidemiology of Plant Diseases*' by D. Gareth Jones; '*Comparative Epidemiology of Plant Diseases*' by J. Kranz; and '*The Epidemiology of Plant Diseases, Second Edition*' by B.M. Cooke, D. Gareth Jones, and B. Kayle). However, "*The Study of Plant Disease Epidemics*" clearly and cohesively synthesises many aspects of plant disease epidemiology from the principles of disease intensity assessment to the various modeling approaches to crop loss assessment. Its tone is instructional and would be of benefit to plant pathologists wishing to augment their skills in plant disease epidemiology, or for teachers of graduate/advanced level classes in plant disease epidemiology, biological systems modeling, and disease

management. At \$89 USD, it would make a fantastic gift for Christmas or PhD graduation! I commend the authors on this historical addition to the plant disease epidemiology literature and highly recommend this publication to all plant pathologists and advanced students.

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