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Book review

Citrus Health Management. Edited by L.W. Timmer and L.W. Duncan. 221 pp., 90 colour photographs, 24 black and white illustrations. Softcover. APS Press, St. Paul, Minnesota, 1999. ISBN 0-89054-227-9. $ 49

Complementing the diagnostic 'Compendium of Citrus Diseases' by Whiteside et al. 1988 at the same publisher, this book is concerned with sustainable health management in the broadest sense, beginning with healthy nursery trees and ending with prevention or control of post-harvest losses.

After a general Introduction, the first section is concerned with orchard establishment. L.K. Jackson surveys citrus cultivation. The importance of selecting rootstock and scions for producing healthy trees is reviewed by W.S. Castle and F.G. Gmitter, whilst the need to prevent infection by graft-transmissible pathogens (mainly viruses) is discussed by R.F. Lee et al. In the section on crop production, horticultural practices (T.A. Wheaton et al.), soil and citrus nutrition (A.K. Alva and D.P.H. Tucker), water management, which sometimes affects the spread of *Phytophthora* (B. Boman et al.), and integrated vegetation management (D.P.H. Tucker and M. Singh) are covered.

The section on crop health is the main interest to plant pathologists. Systemic diseases comprise mostly graft-transmitted viruses for which diagnostic methods are outlined. A quick field guide will help readers to recognize and eliminate attacked plants (S.M. Garnsey). Diseases of fruit and foliage are mostly fungal: *Mycosphaerella* greasy spot, *Colletotrichum* postbloom fruit drop, *Diaporthe* melanose, *Elsinoë* scab, *Xanthomonas* canker, *Guignardia* black spot, and *Alternaria* brown spot (L.W. Timmer). The relative susceptibility of different citrus species to these pathogens is outlined. No biological control is possible, but good cultural practice can reduce need for chemical control. W. Browning warns against unnecessary pesticide use. He lists the diversity of arthropod pests of fruit and foliage and describes the various biological control methods that can be applied against them. To help in deciding when chemical treatments against fungi or arthropods are strictly necessary, a Citrus Integrator has been propagated (see colour plate 52, S. Rogers). Fungal root diseases are mainly due to *Phytophthora* species, which are responsible for foot rot and gummosis and fibrous root rot, but also brown rot of fruit. Monitoring techniques are outlined (J.H. Graham and J.A. Menge). Other pathogens include *Fusarium* dry rot, *Thielaviopsis* black root rot, and *Armillaria* mushroom root rot. Five groups of nematodes can become major pests (L.W. Duncan). Prevention of infestation is possible through planting certified stock. Pre-planting chemical control, but no biological control of nematodes, is used in practice. Only in this connection are mycorrhizal fungi, which can mitigate damage by the burying nematode *Rhodopholus simili*, mentioned. Causes of arthropod pests on citrus roots include mainly weevils (C.W. McCoy). Natural or biological control is possible, mainly by application of nematodes.

In a chapter on economic decisions for growers the costs of treatment are calculated against the revenues (R.P. Muraro and S.H. Futch). Postharvest considerations concern five pathogens with preharvest infection and three with postharvest infection, particularly fungi (G.E. Brown and W.R. Miller). To be successful, chemical treatment against these must be applied immediately after harvest. The current chemical treatments in packing houses are fully reviewed. A coating with *Pseudomonas syringae* or *Candida oleophila* have been approved as a biological control against green and blue *Penicillium* moulds.

The general philosophy of health management has obviously moved a good deal away from the primacy of chemical treatment related to the efficiency of various pesticides. Ecological and economical considerations stand in the foreground of pest and pathogen control with a view of maintaining sanitation and developing disease-free orchards. This philosophy takes account of interactions between different organisms. The decision about chemical treatments must be preceded by quantification of a well-diagnosed disease. Best Management Practice (BMP), being compatible with sustainability, encompasses Integrated Pest Management. Only in post-harvest handling of high quality citrus fruit are fungicide drenches and wax coating deemed to be essential. For processed juice, external quality is less relevant and biological control can be more easily implemented than for fresh-market fruit.

The book is consistently edited and well-structured; graphs and tables are supplied where needed. Boxed explanations of concepts facilitate reading. Four pages

of references for additional information are given, arranged according to topic. Excellent colour plates illustrate diseases, pests and techniques in all phases of citrus handling. The book is mainly written for those interested in citrus culture in Florida. Conditions in other citrus-growing areas are cursorily mentioned. Nevertheless, the straight-forward, concise and comprehensive information in this book will undoubtedly be valuable to practitioners in the field all over the world.

W. GAMS
Centraalbureau voor Schimmelcultures
Baarn, The Netherlands