Book reviews

**Postharvest Diseases of Fruits and Vegetables: Development and Control**

In her comprehensive and timely book, Rivka Barkai-Golan, professor of postharvest pathology at the Hebrew University of Jerusalem, has produced a unique and excellent resource from the very extensive literature on postharvest pathogens of fresh fruits and vegetables. More than 400 pages in length, all of the diverse topics that constitute the subject of postharvest pathology are addressed, including disease initiation, life cycles of the major pathogens, influence of host defenses and maturity on diseases, and host changes following infection. Emphasis is placed on methods to control postharvest diseases, either by chemical, physical, or biological means, or by exploiting natural resistance to infection by the hosts. Many experimental approaches to manage these diseases are described, in addition to those in commercial use. Literature citations are copious and occupy 65 pages. Color plates are present but are few. Anyone with a practical or academic interest in postharvest plant pathology will find this book a valuable resource. The book is an excellent companion to Anna Snowdon's two-volume set "Color Atlas of Post-Harvest Diseases" issued in 1990 (vol. 1) and 1992 (vol. 2), which contained numerous color plates depicting these pathogens and the diseases they cause. The Atlas offers excellent illustrations and descriptions of pathogen life cycles, while Barkai-Golan's book is a resource to understand the modern approaches employed to manage these diseases.

Joseph L. Smilanick
USDA-ARS
San Joaquin Valley Agricultural Sciences Center
9611 South Riverbend Road, Parlier, CA 93648, USA
Tel.: +1-559-596-2810; fax: +1-559-596-2791.
E-mail address: jsmilanick@fresno.ars.usda.gov

**The Avocado: Botany, Production and Uses**

This is a very comprehensive and detailed book on the avocado, edited by three experts and written by a range of specialists from diverse disciplines. The book has 14 chapters, starting with the history of the crop, the taxonomy and botany of the species, reproductive biology, genetics and breeding. The subsequent chapters discuss the various cultivars, the propagation techniques, effects of the environment (weather and soil conditions) on growth, and the effect of irrigation and mineral nutrition. One chapter is devoted to what is called biotechnology, defined as the use of methods such as in vitro culture, somatic embryogenesis, and transformation. The book also contains chapters on diseases caused by algae, fungi and bacteria, and on pests by insects and mites. The final chapter deals with postharvest biology and technology.

All chapters are well written and well illustrated. The volume also contains as many as 69 good colour photographs. There seems only little overlap between the chapters, and there are several cross-references to other chapters. This shows that the editors have done a nice job. The index is all right, but not very detailed. For example, postharvest is not an entry, although an entire chapter is devoted to the subject. The idea of ‘tree storage’ is mentioned a few times in the text, but also not found in the index.

Avocado fruit apparently originates from the Meso-Americas. The species *Persea americana* contains at
least seven subspecies, three of which are commercially important: var. drymifolia from the Mexican highlands; var. guatemalensis from the Guatemalan highlands, and var. americana from the pacific lowlands. Because of geographical isolation these subspecies did not cross-fertilise, though there are no sterility barriers if the plants grow in close proximity. The important cultivar Fuerte is a hybrid of the Mexican and Guatemalan subspecies, and Hass is predominantly Guatemalan in origin, with some Mexican influence.

Avocados have apparently been bred by local people for about 10,000 years, if the evidence is correctly interpreted. Archaeologists found that the seeds became larger in more recent strata, indicating breeding for larger fruit.

It is well known that avocado fruit of several cultivars show little softening when left on the tree after they reach acceptable commercial maturity. The fruit can thus be stored on the tree, for as much as 6 months (p. 224 and 247). If taken from the tree the fruit ripens rapidly. A tree factor is held responsible for this drastic difference, but the nature of this factor is still a mystery. Cultivars such as Hass and Fuerte show the tree factor, but the cultivars derived from the pacific lowland subspecies do not. Fruit of the latter cultivars thus ripen quickly when left on the tree (p. 224). We suggest that the difference between these two groups may well be used to further investigate the nature of the tree factor.

The final chapter deals with postharvest technology and practice. The physiologist will not, in this chapter or elsewhere, find a detailed review on the biochemistry, physiology or molecular biology of ripening. The chapter rather focuses on practical aspects such as quality parameters, maturity indices, and effects of production on postharvest quality. Attention is given to harvesting, transport to the packing shed, sorting, packing and cooling, storage and long-distance transport. Processing of the fruit is also briefly treated. The chapter contains a detailed reference list.

In conclusion we recommend this outstanding volume to any postharvest biologist interested in avocado.

Mark G. Sanders*  
Wouter G. van Doorn  
Agrotechnology and Food Innovations (A&F)  
Wageningen University and Research Centre  
P.O. Box 17, 6700 AA Wageningen  
The Netherlands  
* Corresponding author  
E-mail address: mark.sanders@wur.nl  
(M.G. Sanders)

doi: 10.1016/j.postharvbio.2003.11.010
Topics include the causal agents of postharvest diseases of fruits and vegetables, their sources and their ways of penetration into the host; factors that may accelerate the development of the pathogen in the host - and those that suppress them; a list of the main pathogens of fruits and vegetables, their hosts and the diseases elicited by them; and a detailed description of the major diseases of selected groups of fruits and solanaceous vegetable fruits. Attack mechanisms of pathogens and defense mechanisms of the host are examined as are treatments aimed at suppressing postharvest diseases. Postharvest diseases significantly reduce the shelf-life of harvested fruits/vegetables worldwide. Bacillus spp. are considered to be an eco-friendly and bio-safe alternative to traditional chemical fungicides/bactericides due to their intrinsic ability to induce native anti-stress pathways in plants. This review compiles information from multiple scientific databases (Scopus, ScienceDirect, GoogleScholar, ResearchGate, etc.) using the keywords "postharvest diseases", "Bacillus", "Bacillus subtilis", "biocontrol", "storage", "losses", and "fruits/vegetables". Efficient Biotic Strategy to Control Postharvest Diseases of Fruits and Vegetables. Plants 2019, 8, 97. AMA Style. Knowledge about the various post-harvest causes of quality reduction in vegetables, fruits and potatoes lays the foundation for new strategies to maintain quality. The quality of fruit and vegetable products is determined by external, sensory and nutritional properties. To measure the impact of different storage and logistics scenarios, we quantify various quality indicators. Our dynamic control systems allow us to store fruit at a lower oxygen level, for example, and thus minimise quality losses and energy consumption while prolonging shelf life. Packaging can be even better suited to the specificities of a product. We help companies to extend shelf life and limit waste by providing advice on different types of packaging materials.