

including herbicide tolerance, pest and disease resistance and quality improvement.

The book is well illustrated and is accompanied by an excellent companion web site from which both text and illustrations can be downloaded (academic staff marking essays beware!). The authors have also provided key facts and issues in boxes throughout; clearly considerable thought and care has gone into the design of the book.

A slight criticism is that in some sections the distinction between current and possible future applications of GM technology in agriculture is not clear; a reader trying to find out what the present cultivated GM crops are could struggle. Furthermore, a section on the legislation

covering the use of GM crops and the issues that have lead to the use of GM crops in agriculture being so controversial is relatively brief and could have been more detailed, while the subjects of plant tissue culture and binary vectors are given a whole chapter each.

I certainly would not recommend this book for the non-specialist. Nevertheless, it is likely to be a popular and useful textbook.

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Methods in Polyphenol Analysis

Editors: C. Santos-Buelga and G. Williamson, 2003.
Royal Society of Chemistry, Cambridge, ISBN 0-854-580-5, xiv + 384 pages, £99.50

This volume has its origins in POLYBIND a European Union Framework V project on polyphenols, bioavailability and colon cancer. However, it is much more than a cobbled together series of articles based on the proceedings of a conference and contributions have been obtained from investigators who were not part of the Framework V project. The 16 chapters contain a wealth of information on the extraction, purification and analysis of the major flavonoids and hydroxycinnamates, in foodstuffs and biological samples such as plasma and urine.

At first glance polyphenolic compounds should be relatively simple to analyse, especially in plant tissues where, as the products of secondary metabolism, they often accumulate in sizable quantities. Scratch the surface and it soon becomes apparent that things are not so straight forward because the wide variety of structures have diverse chemical and physical properties, some form oligomeric and polymeric derivatives and in most instances standards are not available from commercial sources. To complicate matters, following ingestion many of these compounds are metabolised forming glucuronide, methyl and sulphonated analogues. Many of the problems associated with polyphenol analysis and the various practical solutions to these problems are discussed in detail in the various chapters of this book.

The first chapter by Escribano-Bailón and Santos-Buelga deals with the extraction of polyphenols from foods. Day and Morgan then discuss the specialised problems associated with extraction and purification of polyphenols in biological samples and fluids and provide much useful information on methods of hydrolysis to

release aglycones, the problems of analysing sulphate conjugates and the stability of samples during storage. The contribution by de Pascual-Teresa and Rivas-Gonzalo summarises the use of HPLC-MS for the identification of anthocyanins, catechins and proanthocyanidins, and finally flavonols and their metabolites. This is a rapidly developing field and the authors provide a useful insight into the value of MS coupled with HPLC in that it can not only detect low nanogram quantities of analytes but can also provide invaluable structural information that can facilitate identification in circumstances that might otherwise be much more difficult to achieve.

There is an article on the use of HPLC with coulometric detection for the analysis of flavonoids by Monach. This includes a number of worked examples including the analysis of rat plasma after ingestion of a grape seed extract and quercetin-3-glucoside, and human urine after soya consumption. Although not providing the structural information like MS, coulometric detection is highly selective and among the topics discussed and illustrated are its use to demonstrate the absence of quercetin glucosides in plasma and how to predict some elements of the structure of an unknown metabolite. There is copious practical and theoretical information in the chapter which will be of value to the experienced investigator and anyone about to use an electrochemical detector for the first time. Likewise the chapters on HPLC with photodiode array detection by Santos-Buelga et al. and HPLC-NMR by Wolfender et al. These are followed by a chapter entitled "Polyphenols: measurement and calculation of their physical chemistry properties" by Cren-Olive and Rolando that deals primarily with the free radical chemistry, and acid-base and redox properties of flavan-3-ols.

Plumb and colleague contribute a chapter in vitro enzyme synthesis of quercetin glucuronides and glucosides which describes the use of enzymes derived from a

variety of sources including onions, leeks and a pig liver extract. Chemical synthesis of a wide range of flavonoid derivatives, including daidzein, daidzein-7-sulphate, diadzein-7-glucuronide, quercetin-3-sulphate, quercetin-3'-sulphate, 3-methylquercetin, quercetin-3-glucuronide, isorhamnetin, and 3'- and 4'-methylcatechin, is described in copious detail in an informative contribution by Plumb et al.

Much of the current interest in the nutritional relevance of phytochemicals has its origins in early 1990s when Dutch investigator Michael Hertog acid hydrolysed fruits, vegetables and beverages containing flavonols and flavones and quantified the released aglycones by isocratic HPLC with detection at 365 nm. The subsequent development of the methodology for the quantitative determination of flavonols in foods and biological fluids is covered in an article by Arts et al. This charts the use of enzyme as well as acid hydrolysis and the increase in sensitivity and selectivity that is necessary to analyse plasma and urine that can be achieved with electrochemical detection or post-column derivatization to form fluorescent flavonol derivatives.

There is a 36 page tour de force by Bond and his colleagues from the Unilever Research Group on the analysis, purification and chemical and physical properties of tea derived catechins, theaflavins and their polymeric oxidation products. There is an enormous amount of valuable information in this chapter which if not presented in this book would probably have remained hidden in laboratory note books and been lost as it would never have been published. This is followed by two extremely useful and detailed reviews, by Lazarus and her American colleagues and Cheynier and Fulcrand, on the specialised procedures involved in the purification and analysis of proanthocyanins and various com-

plexes including tannins from teas, red wines, cocoa and other plant sources.

Clifford contributes a chapter that provides very useful and informed insights into the properties, purification, analysis and characterization of caffeoylquinic acids and other hydroxycinnamate derivatives. Anyone even thinking about analysing chlorogenic acid (5-*O*-caffeoylquinic acid) and related compounds must read this article. Finally, the book concludes with chapters on the analysis and identification of anthocyanins by Rivas-Gonzalo and flavanones, chalcones and dihydroxy-chalcones by Tomás-Barberán et al.

Overall, this is a high quality book that contains much more than a straight forward catalogue of the methods used to purify and identify polyphenols. All the chapters are written by investigators who have a solid analytical background and have made a significant contribution to the field, no “fly-by-night” operators here! The contributors have been well chosen by the editors who have clearly done much work to ensure the high quality of the text and the illustrations. The book is an essential reference for anyone working on the analysis of polyphenols, it is an extremely rich source of information for the experienced investigator and even more so for new comers to the field. It is a book which will be consulted routinely (my copy is already “well-thumbed”) and not one that gathers dust, unused on the top shelf of a bookcase.

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Plant Resources of Southeast Asia (PROSEA) No.17: Fibre Plants

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This text, vol. 17 of the Prosea Handbook series, provides a collection of data on fibre-producing plants, which are important regionally or locally to Southeast Asia. These plants are important natural resources and are grown or collected for their fibres, having commercial applications for textiles, cordage, paper, baskets, mats, wickerwork and thatching. Many of the most economically useful fibre plants in use worldwide

today occur in this region and are described in this book.

A very comprehensive collection of 72 major plant species and 129 minor plant species primarily used as fibre-producers comprises the largest part of the book; a further 450 plant species are listed, whose use as fibre-producers is secondary to their main applications. The 72 major fibre plants described in Chapter 1 include the very important international mainstays of commerce, *Gossypium* spp. (cotton), *Corchorus* spp. (jute) and *Linum usitatissimum* L. (flax), and are arranged alphabetically from *Abroma augusta* (devil's cotton) to *Wikstroemia ovata* (salago). This chapter also contains brief compilations of the chemical and physical compositions