

# Preface

Life sciences progress quickly with each passing day. The improvement of genomics and related analytical techniques greatly promoted the rapid development of transcriptomics, proteomics, metabolomics, and phenomics. Thus, the means of system integration can be employed to reveal life phenomenon at multiple levels. The above research thoughts and methods gave birth to systems biology. Metabolomics is an important part of systems biology. Metabolites are closest to phenotype, thus the change in metabolites can more directly reveal the function of genes. And metabolic markers have important application values in the early diagnosis of diseases. There are a wide range of plant species in nature. Different groups of plant species synthesize different special compounds. It is estimated that there are 0.2–1 million kinds of metabolites synthesized by plants. The structural and physicochemical properties vary widely, making plant metabolomics research more challenging. Since the year 2002 when the first International Plant Metabolomics Conference was held in Wageningen, analytical techniques and methods of plant metabolomics have been developing rapidly and applied in several areas, such as plant scientific research, biotechnology safety assessment, crop breeding, etc., and play important roles in the study of gene function and the analysis of metabolic pathway and metabolic network regulation. Plant metabolomics research in China started around 2005, and currently has a good development trend. This book written in cooperation by researchers active in plant metabolomics in China, not only introduces the latest advances in plant metabolomics and analyzes the development trend in the next few years, but also demonstrates new studies of authors in their respective scientific projects, reflecting the current study level of China very well.

This book includes three parts introducing and demonstrating plant metabolomics. The first part includes an overview of plant metabolomics and the principles, methods, issues, considerations, and developments of metabolite analytical technologies, which mainly include mass spectrometry and nuclear magnetic resonance; the second part includes metabolomics data analysis, metabolites determination, metabolomics database and metabolic network study; the third part includes detailed application examples in plant metabolomics, which mostly are the current research

achievements in recent years. We strive to be realistic and practical in this book, and hope that this book can promote the rapid development of plant metabolomics in China. Immense thanks to the authors of each chapter for taking the time from busy research and teaching tasks. Many authors of this book received the funding of “Metabolism and Regulation of Special Crop Nutrients (2007CB108800)” and the funding of “The Formation Mechanism and Control Approaches of Harmful Substances in Animal Products (2009CB118800)” from “973” plans of Ministry of Science of China. This book received the funding of “Metabolism and Regulation of Special Crop Nutrients” project office, too. Warm thanks to Prof. Chun-Ming Liu from the Institute of Botany of Chinese Academy of Sciences for his concern and help in the publishing of this book. Readers are welcome to criticize and correct errors and shortcomings in this book.

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