PREFACE

While I think we can surely say that metabolomics has quickly become established in a sustainable position in the scientific arena, the technology is nevertheless still very much 'under development'. This will likely remain so for a significant period of time. This is not because we are failing to get the technology up to scratch, but rather, because our demands, expectations and even hopes grow with every new experiment we perform. In plants, in particular, the broad applicability of the technology, as reflected in the scope of the chapters in this book, has been the primary driving force in getting the technology properly developed and integrated. Many, if not all, plant biologists have seen the potential value of having a holistic and detailed insight into the chemical composition of the materials we work with – be it at the cellular or whole plant level, or be it related to pure fundamental research into the complexity of the molecular organization of plants or to the basis of the nutritional value of the foods we eat. By having a better understanding of how plant metabolism is altered by genetic or environmental perturbation, how it is dependent upon cell and tissue differentiation, how it contributes to the daily and seasonal functioning of the plant etc., we will gain a better position regarding how we may control or manipulate this towards improving crop fitness or productivity, enhancing yield and plant product quality.

Plant metabolomics is, in concept, dedicated to facilitating the generation of an in-depth chemical analysis of plant materials. Immediately after its inception, or rather the coining of the term in 1998, the approach was understandably, highly focused on technology developments. This concerned not only analytical and hardware improvements but also, and more importantly, developments in automated data generation, storage, processing and mining. However, in recent years, this focus has gradually moved more and more towards the actual biological relevance of the data being generated and how these data can further our biological understanding of crops and other model plants. For this reason, the primary focus of the chapters in this volume has been chosen to target specifically this aspect and take us one step, at least, above the technological focus that has gone before. Some of the chapters focus on a single species (e.g. tomato and Arabidopsis), emphasising the extensiveness of the analyses that have already taken place on individual topics, while others target specific biological phenomena such as biotic stress, abiotic stress and the ecology of a plant's interaction with its environment. Authors have been chosen who are at the head of their field and, in most cases, chapters have been written by two or more leading scientists coming from at least two different laboratories, and usually, even from different countries. In this way,

the reader should gain a broader overview and opinion of the current added value of the technology and its applications as well as developing a more accurate vision for the future on how the technology will impact the way we proceed with plant science. Undeniably, there will be omissions, and we jointly apologize to all those scientists whose work may have been underexposed. Inevitably, considering the rapid development of the technology, new topics of potentially equal or greater importance than those covered here will rapidly emerge. This is always the case when an approach of such broad potential relevance and applicability quickly becomes adopted and translated in myriad new directions. We still have the feeling that we are just at the beginning and that many, new, exciting developments are in store for the future. This book, hopefully, will even stimulate and lead us into developing some of these new ideas and will bring us a step closer to realising the full biological potential of plant metabolomics approaches.

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