Preface

It is now more than two decades since the first large-scale cultivation of genetically modified (GM) crops and 15 years since the first edition of this book was published. Since then, the use of GM crops has continued to rise around the world, with 185 million hectares being grown in 2016. The number of traits introduced by genetic modification increases steadily, and although herbicide tolerance and insect resistance traits remain dominant, there have been exciting developments in the application of genetic modification to improve nutritional quality and food safety. There is still no established market for GM varieties of some of the world's major crops, including rice and wheat, but GM varieties of soybean, maize, cotton and oilseed rape, in particular, continue to be popular with farmers wherever they have been made available. Recent years have also seen further technological innovation in the development of a range of techniques that enable scientists to make specific changes to target genes. These techniques have been called genome editing, and the first genome edited commercial crop varieties are already in the field.

For crop scientists in the United Kingdom and the rest of Europe the situation remains as frustrating as when the first edition of this book was published in 2003. The GM crop debate of the late 1990s and early 2000s was lost and great damage was done to the European plant biotechnology industry as a result. The European regulatory system remains so difficult to negotiate that biotechnology companies are focussed on obtaining

approval for their products to be imported into Europe so that they can be grown elsewhere rather than approval for their varieties to be cultivated in Europe. European farmers are therefore becoming increasingly disadvantaged as they have to compete with GM crop varieties that they are not allowed to grow. As non-GM crop products become more difficult to source it is recognised that the situation cannot continue as it is, but efforts to re-start the debate are greeted with the same shrill predictions of disaster and the same headlines as before. Turning that situation around will require strong leadership and there is no sign at all of where that leadership might come from. Meanwhile, countries across the Americas and Asia, in particular, continue to extend their lead in developing what will be a key 21st Century technology.

This edition of the book is expanded and updated to cover the latest developments in the techniques and applications of crop biotechnology and the legislation that controls its use, and all sections are extended to include genome editing as well as genetic modification. The motivation for writing the book continues to be to provide answers to legitimate questions about crop biotechnology: what is it, how is it done, how does it differ from what has been done before, is it safe, how is it regulated and what implications does it have for plant breeding, agriculture and the environment?

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