Genetically Modified and Non-Genetically Modified Food Supply Chains: Co-Existence and Traceability

This book is dedicated to:

Sylvie who illuminates my life and supports me every day,

my parents and grandparents without whom nothing would have been.

Yves Bertheau

Genetically Modified and Non-Genetically Modified Food Supply Chains: Co-Existence and Traceability

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Foreword

In 1983, three reports from the University of Gent, the University of Washington, and the Monsanto Company showed that the Ti plasmid of *Agrobacterium tumefaciens* could be used to transfer foreign DNA into the plant genome, thus producing the first genetically modified (GM) plants. This discovery had enormous implications for plant genetics and agriculture. In the last 20 years, plant biotechnology has grown into a multi-billion dollar international industry while GMOs are cultivated on about 150 millions of hectares in around 25 countries.

Europe cultivates only a small amount of GM-crops (mainly GM-maize grown in Spain), though this is likely to increase in the future. This is particularly due to the European consumers' reluctance towards GM-derived foods. The freedom of choice of European consumers has been considered by the European Commission and the Member States through a legislative frame enabling the labelling of food and feed derived from, or consisting of, GMOs. In counterpart, the freedom of producers to grow either GMO, conventional or organic products is maintained by co-existence measures along the full supply chain, that is from seed production to the retailers' shelves.

To develop accurate product labelling and to determine a sustainable co-existence framework, several national and European research projects have been launched. The European research programs such as QPCRGMOFood and GMOChips focused first on GMO traceability and detection methods, then on co-existence issues with SIGMEA, Transcontainer and Co-Extra.

Co-Extra was for 4.5 years (2005–2009) the largest European research project on co-existence and traceability among supply chains. Co-Extra comprised 53 partners from 18 countries with more than 200 scientists with their teams. This program embraced technical, legal and socio-economic issues, starting from seed production, with questions on the availability of non-GM varieties in the long-term, to the economic costs of traceability, with pollen flow studies and detection of unapproved GMOs as some examples of the work done. Numerous papers have already been published by Co-Extra while several more detailed deliverables are available from the website.

However, after such important research, it was thought necessary to present an overview of the work done and of the results obtained through the present book.

Several non-Co-Extra authors were also asked to provide us with a summary of the results of SIGMEA and Transcontainer, modelling results not studied in the project, traceability in non-European countries with labelling policies as well as their views on, for example, GMO-free areas. Indeed, Co-Extra results show that the operators use a practical threshold of 10% of the 0.9% legal labelling threshold. This changes the paradigm of co-existence, from a flexible co-existence scheme to a dedicated production area co-existence frame. Up to now, this co-existence scheme has not been completely finalised so that technical, legal, and societal questions remain unsolved.

It is thus my pleasure to introduce this book where numerous questions find solutions, even though several others remain.

To conclude this foreword, I would like to remind readers that all the issues covered by GM and non-GM supply chain co-existence and traceability have important applications in other food and feed chain traceability areas. For instance, the strategies for detecting unapproved and unknown GMOs may be used in clinical microbiology or biodefense while the increase in the accuracy of detection methods is useful in all other areas such as gene expression. In this way, the co-existence and traceability studies of GM and non-GM supply chains contribute to the improvement of both basic and applied research, as well as to the safety and quality of food chains.

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