

# Pesticide Chemistry

Crop Protection, Public Health, Environmental Safety

*Edited by*

*Hideo Ohkawa, Hisashi Miyagawa, and Philip W. Lee*



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and Philip W. Lee*

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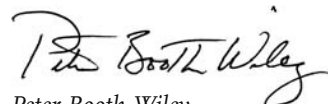
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## Preface

The 11<sup>th</sup> IUPAC International Congress of Pesticide Chemistry was held from August 6–11, 2006, in Kobe, Japan. Since the 5<sup>th</sup> Congress held in Kyoto in 1982, this was the second time that the Congress took place in Japan. During this 24-year time period, we witnessed dramatic changes in science and technology around pesticides. The Congress' subtitle, "Evolution for Crop Protection, Public Health and Environmental Safety", focused on the current situation surrounding pesticides, which are now more commonly referred to as agrochemicals.

Pesticides or agrochemicals have played not only a critical role in the production of food and feed to support the growing world population's demands, but also in control of infectious diseases transmitted by insect vectors and microorganisms. Advances in technologies such as computational chemistry, automated high-throughput biological screens, crop genetics, biotechnology, formulations, and precision agriculture have offered novel tools in the discovery and development of new agrochemicals. For example, new chemical classes such as the sulfonylurea and imidazolinone herbicides, the neonicotinoid insecticides, and the strobilurin fungicides were significant discoveries during this 24-year period.

Public concerns pay more attention to risk assessment and risk management of pesticide use regarding human health and environmental safety. The discovery of "safer" pesticides with new modes of action becomes the challenge of the new generation of pesticide scientists. One of the highlights of this Kobe Congress was the presentation of a novel class of insecticides (Rynaxypyr<sup>TM</sup> and flubendiamide) which target specifically the insect ryanodine receptor. For example, Rynaxypyr<sup>TM</sup> showed laboratory and field activities on all major lepidoptera pests at a low rate of 0.01 ppm (equivalent to approximately 10 g/ha). Furthermore, a 350<sup>+</sup>-fold difference in safety/selectivity was observed between mammalian and insect cell targets. Both compounds show a great safety margin to non-target organisms. These attributes set new standards for new safe and active insecticides.

The high cost of conducting pesticide research and discovery, along with the ever-increasing pesticide registration requirements and regulations, also have a negative impact on the advances of pesticide science. With an estimated cost of approximately 200 million USD and 11 years to bring a new pesticide from discovery to the market place, this economic pressure resulted in a significant consolidation of the agrochemical business during the past 10<sup>+</sup> years. Today, fewer than 10 major agrochemical companies remain. Important products

such as the organophosphate and carbamate insecticides, chloroacetanilide and triazine herbicides are withdrawn/canceled due to the high cost of re-registration, unfavorable acute human toxicity, and/or environmental persistence issues. The cancellation of these products has a significant impact on farmers, especially in developing countries. It is a continuous loss of useful tools in crop protection and public health protection. The topics of global harmonization of pesticide residues (MRL) and vector-borne communicable diseases were addressed in this Congress.

On a more positive note, presentations on new technologies and approaches from this Congress offer a bright future for discovery of a new generation of low use rate, highly selective, and environmentally friendly products.

The Congress had 1142 participants from 52 countries. The Congress' scientific program included the keynote address, 4 plenary lectures, and approximately 110 session lectures. In addition to the platform lectures, more than 550 posters were submitted. The poster award committee selected three excellent papers from each of three categorized presentations. The first paper in each category was also awarded by IUPAC. This publication includes the keynote address, 4 plenary lectures, and one or two papers in each of 20 sessions, and the posters awarded by IUPAC.

We take this opportunity to acknowledge the efforts from members of the organizing and programming committees, along with the help from countless volunteers. We also need to point out several novel programs implemented at this Congress, including the Research Director Forum, the programming of the special luncheon and evening seminars, and the publication of the Congress News Letter (Kobe Gazette).

The publication of the Congress Proceeding is a time-honored tradition for the IUPAC International Congress of Pesticide Chemistry. This Proceeding not only accurately documents the scientific contents of this Conference, but also highlights significant advances and important issues facing pesticide science and technology. The Editorial Team expresses our appreciation to Wiley-VCH (Germany) and Dr. Frank O. Weinreich for the publication of this Proceeding. In particular, we gratefully acknowledge the dedicated editorial support provided by Ms. Carol Ashman.

Finally, this Proceeding is dedicated to all past and present pesticide scientists; it is their vision and creativity that continue to push back the frontier of pesticide sciences. We look forward to seeing you at the 12<sup>th</sup> IUPAC International Congress of Pesticide Chemistry, in Melbourne, Australia, 2010.

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## Contents

11<sup>th</sup> IUPAC International Congress of Pesticide Chemistry V

Preface VII

List of Contributors XXVII

### I Keynote and Plenary Lectures 1

#### 1 Challenges and Opportunities in Crop Production Over the Next Decade 3

*James C. Collins, Jr.*

- 1.1 Meeting Society's Agricultural Needs 3
- 1.2 Global Trends and Uncertainties 3
- 1.3 Grain Stocks 5
- 1.4 Exchange Rates 6
- 1.5 Biofuels 8
- 1.6 Counterfeit Products 9
- 1.7 Product Commercialization 10
- 1.8 Convergence of Factors 11

#### 2 Searching Environmentally Benign Methods for Pest Control:

**Reflections of a Synthetic Chemist 13**

*Kenji Mori*

- 2.1 Introduction 13
- 2.2 Pesticides and Our Daily Life 13
- 2.3 Contributions in Pesticides Discovery by Japanese Scientists 14
- 2.4 Natural Products Synthesis and Pesticide Science 16
- 2.5 Enantioselective Pheromone Synthesis and Pesticide Science 18
- 2.6 Conclusion 21
- 2.7 References 21

<b>3</b>	<b>The Current Status of Pesticide Management in China</b>	<b>23</b>
	<i>Yong Zhen Yang</i>	
3.1	Introduction	23
3.2	The Current Direction of Pesticide R&D in China	23
3.2.1	The Status of Pesticide Production and Usage in China	24
3.2.2	Pesticide Regulation and Management Systems in China	24
3.3	China's Policies in Pesticide Regulation and Management	26
3.4	The Regulatory Infrastructure within China in the Regulation of Pesticide	27
3.5	Key Administrative Actions on Pesticide Management	27
3.6	Future Direction of Pesticide Regulation in China	28
3.7	Conclusion	28
<b>4</b>	<b>Pesticide Residues in Food and International Trade: Regulation and Safety Considerations</b>	<b>29</b>
	<i>Kenneth D. Racke</i>	
4.1	Introduction	29
4.2	Globalization of the Food Chain	30
4.3	Regulation of Pesticide Residues in Food	31
4.3.1	The World Food Code and Codex MRLs	31
4.3.2	U.S. Tolerances	33
4.3.3	Japan MRLs	33
4.3.4	EU MRLs	34
4.4	Disharmonized MRLs, Monitoring, and Consumer Safety	35
4.5	Recent Trends	37
4.5.1	Improvements in the Codex System	37
4.5.2	Regionalization of MRL Policies	37
4.5.3	Growth of Private Standards	38
4.5.4	Communication of MRL Information	38
4.5.5	Adoption of Practices to Preempt or Mitigate Residue Issues	39
4.6	Conclusion	40
4.7	Acknowledgments	40
4.8	References	41
<b>5</b>	<b>Hunger and Malnutrition Amidst Plenty: What Must be Done?</b>	<b>43</b>
	<i>Shivaji Pandey, Prabhu Pingali</i>	
5.1	Introduction	43
5.2	The Current Situation	44
5.3	What Must be Done?	46
5.3.1	National Commitment and Good Governance	46
5.3.2	Investment in Rural Infrastructure	47
5.3.3	Improving Irrigation Infrastructure	47
5.3.4	Improving Soil Fertility	47
5.3.5	Improved Agricultural Technologies	48
5.3.6	Energy Supply Needs to be Improved	48

- 5.3.7 Development Assistance is Needed 49
- 5.3.8 Trade Helps Rural Poor 49
- 5.3.9 Implementing Policies that Promote Protection of Natural Resource Base 50
- 5.3.10 Preparing for the Future 50
- 5.4 References 50

## II New Chemistry 53

### 6 Modern Tools for Drug Discovery in Agricultural Research 55

*Alexander Klausener, Klaus Raming, Klaus Stenzel*

- 6.1 Introduction 55
- 6.2 Tools and Their Integration in the Drug Discovery Process 56
- 6.3 Mode of Action Elucidation – An Example for the Integration of New Technologies 58
- 6.4 Conclusion 62
- 6.5 Acknowledgments 63
- 6.6 References 63

### 7 Target-Based Research: A Critical Review of Its Impact on Agrochemical Invention, Focusing on Examples Drawn from Fungicides 65

*Stuart J. Dunbar, Andrew J. Corran*

- 7.1 Introduction 65
- 7.2 Selection of Targets for *In Vitro* Screening 66
- 7.3 Assay Design and Implementation 68
- 7.4 *In Vitro* to *In Vivo* Translation 70
- 7.5 Structure Based Design 71
- 7.6 Conclusion and a Forward Look 72
- 7.7 References 73

### 8 Virtual Screening in Crop Protection Research 77

*Klaus-Jürgen Schleifer*

- 8.1 Introduction 77
- 8.2 General Lead Identification Strategies 77
- 8.3 Virtual Screening Based on 1-D and 2-D Descriptors 78
- 8.4 Virtual Screening Based on 3-D Descriptors 81
  - 8.4.1 Ligand-Based Screening Strategies 81
  - 8.4.2 Structure-Based Screening Strategies 83
- 8.5 Conclusion 87
- 8.6 References 87

- 9      Synthesis of Triazolo[1,5-c]pyrimidine Sulfonamides Leading to the Discovery of Penoxsulam, a New Rice Herbicide 89**  
*Timothy C. Johnson, Timothy P. Martin, Rick K. Mann*
- 9.1 Introduction 89
- 9.2 Chemistry 89
- 9.3 Biology 93
- 9.4 Selection of Penoxsulam for Development 98
- 9.5 Conclusion 99
- 9.6 References 99
- 10     Discovery and SAR of Pinoxaden:  
A New Broad Spectrum, Postemergence Cereal Herbicide 101**  
*Michel Muehlebach, Hans-Georg Brunner, Fredrik Cederbaum,  
Thomas Maetzke, René Mutti, Anita Schnyder, André Stoller,  
Sebastian Wendeborn, Jean Wenger, Peter Boutsalis, Derek Cornes,  
Adrian A. Friedmann, Jutta Glock, Urs Hofer, Stephen Hole,  
Thierry Niderman, Marco Quadranti*
- 10.1 Introduction 101
- 10.2 Optimization Phase and Discovery of Pinoxaden 102
- 10.3 Chemistry 103
- 10.4 Mode of Action 105
- 10.5 Structure-Activity Relationships 105
- 10.6 Biological Performance 106
- 10.6.1 Grass Weed Spectrum 106
- 10.6.2 Crop Tolerance in Wheat and Barley 106
- 10.6.3 Adjuvant Effect – Adigor<sup>®</sup> 107
- 10.6.4 Introducing Axial<sup>®</sup> 108
- 10.7 Conclusion 109
- 10.8 Acknowledgments 109
- 10.9 References 109
- 11     Rynaxypyr<sup>™</sup>: A New Anthranilic Diamide Insecticide Acting at the Ryanodine Receptor 111**  
*George P. Lahm, Thomas M. Stevenson, Thomas P. Selby,  
John H. Freudenberger, Christine M. Dubas, Ben K. Smith, Daniel Cordova,  
Lindsey Flexner, Christopher E. Clark, Cheryl A. Bellin, J. Gary Hollingshaus*
- 11.1 Introduction 111
- 11.2 Discovery of the Anthranilic Diamide Insecticides 112
- 11.3 Discovery of Rynaxypyr<sup>™</sup> 115
- 11.4 Biological Attributes 117
- 11.5 Toxicology 117
- 11.6 Mechanism of Action 118
- 11.7 Conclusion 119
- 11.8 Dedication 120
- 11.9 References 120

- 12 Elucidation of the Mode of Action of Rynaxypyr™, a Selective Ryanodine Receptor Activator 121**  
*Daniel Cordova, Eric A. Benner, Matthew D. Sacher, James J. Rauh, Jeffrey S. Sopa, George P. Lahm, Thomas P. Selby, Thomas M. Stevenson, Lindsey Flexner, Timothy Caspar, James J. Ragghianti, Steve Gutteridge, Daniel F. Rhoades, Lihong Wu, Rejane M. Smith, Yong Tao*
- 12.1 Introduction 121
- 12.2 Symptomology Associated with Anthranilic Diamides 121
- 12.3 Rynaxypyr™ Stimulates Release of RyR-Mediated Internal Ca<sup>2+</sup> Stores 122
- 12.4 Rynaxypyr™ Binds to a Unique Site on the RyR 123
- 12.5 Cloning and Expression of Pest Insect RyRs 124
- 12.6 Rynaxypyr™ is Highly Selective for Insect RyRs 124
- 12.7 Conclusion 125
- 12.8 References 125
- 13 Flubendiamide, a New Insecticide Characterized by Its Novel Chemistry and Biology 127**  
*Akira Seo, Masanori Tohnishi, Hayami Nakao, Takashi Furuya, Hiroki Kodama, Kenji Tsubata, Shinsuke Fujioka, Hiroshi Kodama, Tetsuyoshi Nishimatsu, Takashi Hirooka*
- 13.1 Introduction 127
- 13.2 Structure-Activity Relationship 128
- 13.2.1 Lead Generation 128
- 13.2.2 Lead Optimization 128
- 13.3 Chemistry 130
- 13.4 Mode of Action 132
- 13.5 Biological Profile 132
- 13.6 Toxicological Properties 134
- 13.7 Conclusion 135
- 13.8 Acknowledgments 135
- 13.9 References 135
- 14 Flubendiamide Stimulates Ca<sup>2+</sup> Pump Activity Coupled to RyR-Mediated Calcium Release in Lepidopterous Insects 137**  
*Takao Masaki, Noriaki Yasokawa, Ulrich Ebbinghaus-Kintscher, Peter Luemmen*
- 14.1 Introduction 137
- 14.2 Calcium Release Induced by Flubendiamide 138
- 14.3 Specific Stimulation of Ca<sup>2+</sup> Pump 138
- 14.4 Luminal Ca<sup>2+</sup> Mediated Ca<sup>2+</sup> Pump Stimulation 139
- 14.5 Conclusion 140
- 14.6 References 140

- 15 Novel Arylpyrazole and Arylpyrimidine Anthranilic Diamide Insecticides** 141  
*Thomas P. Selby, Kenneth A. Hughes, George P. Lahm*
- 15.1 Introduction 141
- 15.2 Synthesis of Anthranilic Diamides 142
- 15.3 Insecticidal Activity 144
- 15.4 Conclusion 145
- 15.5 Acknowledgment 148
- 15.6 References 148
- 16 Metofluthrin: Novel Pyrethroid Insecticide and Innovative Mosquito Control Agent** 149  
*Yoshinori Shono, Kazuya Ujihara, Tomonori Iwasaki, Masayo Sugano, Tatsuya Mori, Tadahiro Matsunaga, Noritada Matsuo*
- 16.1 Introduction 149
- 16.2 Discovery 149
- 16.3 Efficacy 152
- 16.3.1 Intrinsic Insecticidal Activity 152
- 16.3.2 Activity in Devices 153
- 16.3.2.1 Heated Formulations 153
- 16.3.2.2 Non-heated Formulations 155
- 16.4 Conclusion 158
- 16.5 Acknowledgment 158
- 16.6 References 158
- 17 Design and Structure-Activity Relationship of Novel Neonicotinoids** 159  
*Xuhong Qian, Yanli Wang, Zhongzhen Tian, Xusheng Shao, Zhong Li, Jinliang Shen, Qingchun Huang*
- 17.1 Introduction 159
- 17.2 Selectivity Mechanism and Binding Model of Neonicotinoids 159
- 17.2.1 Bioinformatic Analysis 159
- 17.2.2 *Ab initio* Quantum Chemical Calculation 161
- 17.3 Chemical Modification for *cis* Nitro Configuration 165
- 17.3.1 Synthesis 165
- 17.3.2 Biological Activity 166
- 17.3.3 QSAR Analysis 167
- 17.4 Conclusion 168
- 17.5 References 168
- 18 Synthesis and Inhibitory Action of Novel Acetogenin Mimics  $\Delta$ lac-Acetogenins: A New Class of Inhibitors of Mitochondrial NADH-Ubiquinone Oxidoreductase (Complex-I)** 171  
*Hideto Miyoshi, Naoya Ichimaru, Masatoshi Murai*
- 18.1 Introduction 171
- 18.2 Mode of Action of  $\Delta$ lac-Acetogenins 172



- 18.3 SAR of  $\Delta$ lac-Acetogenins 173
- 18.4 Conclusion 173
- 18.5 References 174

### III **Biology, Natural Products and Biotechnology** 175

#### **19 Plant Chemical Biology: Development of Small Active Molecules and Their Application to Plant Physiology, Genetics, and Pesticide Science** 177

*Tadao Asami, Nobutaka Kitahata, Takeshi Nakano*

- 19.1 Introduction 177
- 19.2 Development of BR Biosynthesis Inhibitors 178
  - 19.2.1 Assay Methods for BR Biosynthesis Inhibitors 179
  - 19.2.2 Structure-Activity Relationship Study 180
  - 19.2.3 Target Site(s) of BR Biosynthesis Inhibitor 180
  - 19.2.4 Searching for Novel BR Biosynthesis Inhibitors 181
- 19.3 Functions of BRs in Plant Development Unveiled by BR Biosynthesis Inhibitors 182
- 19.4 BR Biosynthesis Inhibitors as a Useful Screening Tool for BR Signaling Mutants 183
- 19.5 Usefulness of Biosynthesis Inhibitors of Biologically Active Molecules in Plant Biology 184
- 19.6 Abscisic Acid Biosynthesis Inhibitors Targeting 9-cis-Epoxycarotenoid Dioxygenase (NCED) 184
- 19.7 Conclusion 186
- 19.8 References 186

#### **20 An Overview of Biopesticides and Transgenic Crops** 189

*Takashi Yamamoto, Jack Kiser*

- 20.1 Introduction 189
- 20.2 *Bacillus thuringiensis* 190
- 20.3 Spray-On Bt Insecticide Formulations 190
- 20.4 Discovery of Multiple Toxins in One Bt Strain 191
- 20.5 Mode of Action of Bt Insecticidal Proteins 192
- 20.6 Transgenic Bt-Crops 193
- 20.7 Selection of Bt Genes for Transgenic Cotton 194
- 20.8 Corn Insect Pests and Bt Genes 195
- 20.9 Potential Issues of Bt-Crops 195
- 20.10 Insect Resistance to Bt 196
- 20.11 Resistance Mechanism 196
- 20.12 Resistance Management Program for Bt Transgenic Crops 197
- 20.13 Conclusion 197
- 20.14 References 198

<b>21</b>	<b>Essential Oil-Based Pesticides: New Insights from Old Chemistry</b>	<b>201</b>
	<i>Murray B. Isman, Cristina M. Machial, Saber Miresmailli, Luke D. Bainard</i>	
21.1	Introduction	201
21.2	Essential Oil Composition	201
21.3	Biological Activities of Essential Oils	202
21.3.1	Insecticidal/Deterrent Effects	203
21.3.2	Herbicidal Activity	205
21.3.3	Antimicrobial Activity	207
21.4	Challenges and Future Opportunities	208
21.5	Conclusion	208
21.6	References	209
<b>22</b>	<b>Eco-Chemical Control of the Potato Cyst Nematode by a Hatching Stimulator from Solanaceae Plants</b>	<b>211</b>
	<i>Akio Fukuzawa</i>	
22.1	Introduction	211
22.2	Classification of Cyst Nematodes and Research History to Elucidate the Naturally Occurring Hatching Stimulants	211
22.3	Involvement of Multiple Factors in Hatching Stimulation for Cyst Nematodes	212
22.4	Isolation of Hatching Stimulators and Stimulation Synergists in TRD	214
22.5	Application of TRD to Decrease PCN Density in Soil	214
22.6	References	215
<b>23</b>	<b>Vector Competence of Japanese Mosquitoes for Dengue and West Nile Viruses</b>	<b>217</b>
	<i>Yuki Eshita, Tomohiko Takasaki, Ikuo Takashima, Narumon Komalamisra, Hiroshi Ushijima, Ichiro Kurane</i>	
23.1	Introduction	217
23.2	Possible Vector of Japanese Mosquitoes Against Dengue Virus	217
23.2.1	Susceptibility of Orally Infected Japanese Mosquitoes	218
23.2.2	Transmission of Mouse-Adapted or Non-mouse Passaged Dengue Viruses by the Japanese Mosquito Species	219
23.2.3	Further Analysis for Vector Mosquitoes to Dengue Viruses in Japan	220
23.3	Possible Vector of Japanese Mosquitoes Against West Nile Virus	221
23.3.1	Susceptibility of Japanese Mosquitoes Against West Nile Virus	221
23.3.2	Transmission of Japanese Mosquitoes Against West Nile Virus	223
23.4	Conclusion	223
23.5	Acknowledgments	224
23.6	References	224

<b>24</b>	<b>Life Science Applications of Fukui Functions</b>	<b>227</b>
	<i>Michael E. Beck, Michael Schindler</i>	
24.1	Introduction	227
24.2	Theoretical Background	228
24.2.1	Some Results from Conceptual DFT [19–23]	228
24.2.2	Why Fukui Functions May be Related to Sites of Metabolism	230
24.3	Methods	230
24.4	Example Applications	231
24.4.1	Parathion and Chlorpyrifos: Fukui Functions Related to Biotic Degradation	231
24.4.2	Selective Thionation of Emodepsid	233
24.4.3	Fukui Functions Reveal the Nature of the Reactive Species in Cytocrome P450 Enzymes	234
24.5	Conclusion and Outlook	235
24.6	Acknowledgments	235
24.7	References	236
<b>IV</b>	<b>Formulation and Application Technology</b>	<b>239</b>
<b>25</b>	<b>Homogeneous Blends of Pesticide Granules</b>	<b>241</b>
	<i>William L. Geigle, Luann M. Pugh</i>	
25.1	Introduction	241
25.2	Granule Blend Products	242
25.2.1	General Theory of Segregation	242
25.2.2	Sampling of Granule Blends	242
25.2.3	Manufacture of Granule Blends	244
25.2.4	Regulatory Requirements for Granule Blends	244
25.2.5	Measurement of Homogeneity	245
25.2.6	Advantages of Granule Blends	246
25.3	Conclusion	246
25.4	References	247
<b>26</b>	<b>Sprayable Biopesticide Formulations</b>	<b>249</b>
	<i>Prem Warrior, Bala N. Devisetty</i>	
26.1	Introduction	249
26.2	The Biopesticide Market	250
26.3	Biological Pesticides	250
26.4	Factors Affecting Biopesticide Use	251
26.4.1	The Living System	251
26.4.2	The Production System	252
26.4.3	Biological Activity	253
26.4.4	Stabilization	253
26.4.5	Quality Control	253
26.4.6	Delivery	254

- 26.5 Role of Formulations in Sprayable Biopesticides 254
  - 26.6 Future Outlook and Needs 256
  - 26.7 References 257
- V Mode of Action and IPM 259**
- 27 Molecular Basis of Selectivity of Neonicotinoids 261**  
*Kazuhiko Matsuda*
  - 27.1 Introduction 261
  - 27.2 Interactions with Basic Residues Induce a Positive Charge in Neonicotinoids which Mimics the Quaternary Ammonium of Acetylcholine 261
  - 27.3 Exploring Structural Features of nAChRs Contributing to the Selectivity of Neonicotinoids Employing the  $\alpha 7$  nAChR 263
  - 27.4 Homology Modeling of nAChRs has Assisted in the Identification of Key Amino Acid Residues Involved in the Selective Interactions with Neonicotinoids of Heteromeric Nicotinic Acetylcholine Receptors 265
  - 27.5 Conclusion 268
  - 27.6 Acknowledgments 269
  - 27.7 References 269
- 28 Target-Site Resistance to Neonicotinoid Insecticides in the Brown Planthopper *Nilaparvata lugens* 271**  
*Zewen Liu, Martin S. Williamson, Stuart J. Lansdell, Zhaojun Han, Ian Denholm, Neil S. Millar*
  - 28.1 Introduction 271
  - 28.2 Identification of Target-Site Resistance in *Nilaparvata lugens* 271
  - 28.3 Characterization of a nAChR (Y151S) Mutation in *N. lugens* 272
  - 28.4 Discussion 273
  - 28.5 Conclusion 274
  - 28.6 References 274
- 29 QoI Fungicides: Resistance Mechanisms and Its Practical Importance 275**  
*Karl-Heinz Kuck*
  - 29.1 Introduction 275
  - 29.2 Resistance Risk Assessments Before Market Introduction 275
  - 29.3 Resistance Mechanisms of QoI Fungicides in Field Isolates 276
    - 29.3.1 Mutation Upstream Complex I 276
    - 29.3.2 Metabolization by Fungal Esterases 277
    - 29.3.3 Target Mutation G143A 277
    - 29.3.4 Target Mutation F129L 277
  - 29.4 Practical Importance of Individual Resistance Mechanisms to QoIs 278

29.5	Resistance Management	280
29.6	Perspectives	280
29.7	Conclusion	282
29.8	References	282
<b>30</b>	<b>Chemical Genetic Approaches to Uncover New Sites of Pesticide Action</b>	<b>285</b>
	<i>Terence A. Walsh</i>	
30.1	Introduction	285
30.2	The Chemical Genetic Approach	285
30.3	Components of a Chemical Genetic Process	287
30.3.1	Chemical Libraries	287
30.3.2	Phenotype Screens	287
30.3.3	Target Site Identification	288
30.4	Three Examples of Chemical Genetic Target Identification	288
30.4.1	NP-1, a Complex Natural Product	289
30.4.2	ATA-7, a Bleaching Phenotype	290
30.4.3	DAS534, a Picolinate Auxin	291
30.5	Key Learnings	293
30.6	Conclusion	293
30.7	Acknowledgments	294
30.8	References	294
<b>31</b>	<b>The History of Complex II Inhibitors and the Discovery of Penthiopyrad</b>	<b>295</b>
	<i>Yuji Yanase, Yukihiro Yoshikawa, Junro Kishi, Hiroyuki Katsuta</i>	
31.1	Introduction	295
31.2	Discovery of Penthiopyrad (MTF-753)	297
31.3	Biological Attributes	298
31.3.1	Target Site of Penthiopyrad	299
31.3.2	Mode of Action	299
31.3.3	Effect on Resistant Strains of Other Fungicides	300
31.3.4	The Risk of Occurrence of Resistance to Penthiopyrad	301
31.4	Conclusion	302
31.5	Acknowledgments	302
31.6	References	302
<b>32</b>	<b>The Costs of DDT Resistance in <i>Drosophila</i> and Implications for Resistance Management Strategies</b>	<b>305</b>
	<i>Caroline McCart and Richard ffrench-Constant</i>	
32.1	Introduction	305
32.2	Global Spread of DDT Resistance	305
32.3	Lack of Fitness Cost	307
32.4	Single Genes in the Field and Many in the Laboratory	309
32.5	Implications for Resistance Management	309

- 32.6 Conclusion 310
- 32.7 References 311

## **VI Human Health and Food Safety 313**

- 33 New Dimensions of Food Safety and Food Quality Research 315**  
*James N. Seiber*
  - 33.1 Introduction 315
  - 33.2 New Analytical Methods for Identification and Source Tracking 316
  - 33.3 Methods for Reducing Aflatoxins in Foods 318
  - 33.4 Molecular Biology and Food Safety 319
  - 33.5 Healthy Food Constituents 320
  - 33.6 Conclusion 321
  - 33.7 References 321
  
- 34 Impact of Pesticide Residues on the Global Trade of Food and Feed in Developing and Developed Countries 323**  
*Jerry J. Baron, Robert E. Holm, Daniel L. Kunkel, Hong Chen*
  - 34.1 Introduction 323
  - 34.2 Potential Solutions 324
    - 34.2.1 The IR-4 Model and Other Minor Use Programs 325
    - 34.2.2 Tools for Harmonization 326
      - 34.2.2.1 Crop Grouping 326
      - 34.2.2.2 Work Sharing 328
      - 34.2.2.3 Rationalized Global Data Requirements 329
  - 34.3 References 330
  
- 35 Pesticide Residue Assessment and MRL Setting in China 331**  
*Yibing He, Wencheng Song*
  - 35.1 Introduction 331
  - 35.2 Regulations and National Standards for Pesticide Residue Management in China 331
    - 35.2.1 Key Components of Pesticide Management Regulation of China for Pesticide Residue 331
    - 35.2.2 Key Components of National Standards for Pesticide Residue Management in China 332
  - 35.3 Summary of Date Requirements of Pesticide Registration 332
  - 35.4 Residue Data Requirements 333
    - 35.4.1 The Protocol of Field Trials 333
    - 35.4.2 Residue Analysis Method 333
    - 35.4.3 Experimental Results 333
  - 35.5 Procedures for Establishing MRLs and Setting Up PHI in China 334
  - 35.6 Examples of MRL Setting in China 335
  - 35.7 Perspective 339

- 36 Harmonization of ASEAN MRLs, the Work towards Food Safety and Trade Benefit 341**  
*Nuansri Tayaputch*
- 36.1 Introduction 341
- 36.2 Role of Codex MRLs in Regulating Food Quality 341
- 36.3 Pesticide Residues in Developing Countries 342
- 36.4 Issues on Minor Crops 343
- 36.5 The Work of ASEAN Expert Working Group on Pesticide Residues 343
- 36.6 Principles of Harmonization 344
- 36.7 Several Observations Made During the Process of Harmonization from 1998 to 2005 345
- 36.8 Future Outlook 346
- 36.8.1 ASEAN MRLs with Quality Data Conducted at Regional Levels on Tropical Crops Should be Established as International Standards 346
- 36.8.2 Member Countries Should Have Comprehensive Knowledge on MRLs' Establishment Consistent with International Guidelines 346
- 36.9 Conclusion 347
- 36.10 References 347
- 37 Possible Models for Solutions to Unique Trade Issues Facing Developing Countries 349**  
*Cecilia P. Gaston, Arpad Ambrus, and Roberto H. González*
- 37.1 Introduction 349
- 37.2 Possible Solution to the Lack of Analytical Facilities and Expertise on Developing Data to Support Establishment of MRLs 350
- 37.3 A Solution to the Lack of MRLs on Spices 351
- 37.3.1 Rationale for an Alternative Approach to Setting MRLs for Spices 351
- 37.3.2 Codex MRLs for Spices 352
- 37.3.3 Codex MRLs for Dried Chili Peppers 352
- 37.4 Difficulties of Complying with Unharmonized MRLs, Including 'Private' MRLs 355
- 37.4.1 Program to Facilitate Exports of Chilean Fruits 356
- 37.4.2 Generating Pre-Harvest Interval Data 356
- 37.4.3 An Example of a Supervised Trial Model in the "Pesticide Agenda" 357
- 37.5 Conclusion 357
- 37.6 References 358
- 38 Genetically Modified (GM) Food Safety 361**  
*Gijs A. Kleter, Harry A. Kuiper*
- 38.1 Introduction 361
- 38.2 General Principles of GM Food Safety Assessment 362
- 38.3 General Data 364
- 38.4 Molecular Characterization of the Introduced DNA 364

38.5	Comparison of the GMO with a Conventional Counterpart	364
38.6	Potential Toxicity of Introduced Foreign Proteins	365
38.7	Potential Toxicity of the Whole Food	365
38.8	Potential Allergenicity of the Introduced Foreign Proteins	365
38.9	Potential Allergenicity of the Whole Food	366
38.10	Potential Horizontal Gene Transfer	366
38.11	Nutritional Characteristics	367
38.12	Potential Unintended Effects of the Genetic Modification	367
38.13	Pesticide Residues	369
38.14	Research into the Safety of GM Crops	369
38.15	Conclusion	370
38.16	Acknowledgment	370
38.17	References	370
<b>39</b>	<b>Toxicology and Metabolism Relating to Human Occupational and Residential Chemical Exposures</b>	<b>373</b>
	<i>Robert I. Krieger, Jeff H. Driver, John H. Ross</i>	
39.1	Introduction	373
39.2	Pesticide Handlers	374
39.3	Harvesters of Treated Crops	376
39.4	Residents Indoors	376
39.5	Estimates of Human Exposure	377
39.6	Exposure Biomonitoring	378
39.7	Conclusion	380
39.8	References	380
<b>40</b>	<b>Bioavailability of Common Conjugates and Bound Residues</b>	<b>383</b>
	<i>Michael W. Skidmore, Jill P. Benner, Cathy Chung Chun Lam, James D. Booth, Terry Clark, Alex J. Gledhill, Karen J. Roberts</i>	
40.1	Introduction	383
40.2	Literature Search	384
40.3	Experimental Phase	385
40.3.1	Conjugates	386
40.3.2	Chemical and Enzymatic Hydrolysis	386
40.3.3	Prediction of Permeability	388
40.3.4	Bound Residues	389
40.3.5	Characterization of the Bound Residues	390
40.3.6	Chemical and Enzymatic Hydrolysis	390
40.3.7	Bioavailability of Bound Residues	391
40.4	Conclusion	392
40.5	Acknowledgment	392
40.6	References	393



- 41      **Multiresidue Analysis of 500 Pesticide Residues in Agricultural Products Using GC/MS and LC/MS**   395**  
*Yumi Akiyama, Naoki Yoshioka, Tomofumi Matsuoka*
- 41.1   Introduction   395
- 41.2   Multiple Residue Analysis   395
- 41.3   Monitoring Results   398
- 41.4   Conclusion   399
- 41.5   References   399
- 
- VII      **Environmental Safety**   401**
- 
- 42      **Current EU Regulation in the Field of Ecotoxicology**   403**  
*Martin Streløke*
- 42.1   Introduction   403
- 42.2   Regulatory Process   403
- 42.3   Standard Risk Assessment   404
- 42.4   Refined Risk Assessments   406
- 42.4.1   Refined Risk Assessments for Birds and Mammals   407
- 42.4.2   Persistent Compounds in Soil   407
- 42.4.3   Use of Probabilistic Risk Assessment Methods for Regulatory Purposes   407
- 42.4.4   Microcosm/Mesocosm Testing with Aquatic Organisms   409
- 42.4.5   Data from Monitoring Studies   410
- 42.4.6   Endocrine Disruption   410
- 42.5   Risk Mitigation Measures   411
- 42.6   Conclusions   412
- 42.7   References   412
- 
- 43      **A State of the Art of Testing Methods for Endocrine Disrupting Chemicals in Fish and Daphnids**   415**  
*Satoshi Hagino*
- 43.1   Introduction   415
- 43.2   Fish Testing Methods for Sex Hormones   415
- 43.3   S-rR Strain Medaka and Sex Reversal Test   416
- 43.4   Effects of Pesticides Listed in SPEED '98   419
- 43.5   Advantages and Disadvantages of the Endpoints Selected   419
- 43.6   Consistency of the Results Obtained Between Sex Reversal Assay, PLC, and FLC   421
- 43.7   Development of Test Method for Thyroid Hormone   422
- 43.8   Endocrine Disrupting Effect of JH Mimics to Daphnids   422
- 43.9   Conclusion   423
- 43.10   References   424

- 44 Pesticide Risk Evaluation for Birds and Mammals – Combining Data from Effect and Exposure Studies 425**  
*Christian Wolf, Michael Riffel, Jens Schabacker*
- 44.1 Introduction 425
- 44.2 Principles of the Risk Assessment within the EU 426
- 44.3 Refined Risk Assessment 426
- 44.4 Higher-Tiered Studies 426
- 44.5 Case Study for Combining Effects and Exposure Studies 427
- 44.6 Conclusion 428
- 44.7 Reference 429
- 45 Bioassay for Persistent Organic Pollutants in Transgenic Plants with Ah Receptor and GUS Reporter Genes 431**  
*Hideyuki Inui, Keiko Gion, Yasushi Utani, Hideo Ohkawa*
- 45.1 Introduction 431
- 45.2 Dioxins 432
- 45.3 Dioxin Bioassays 432
- 45.4 The AhR 433
- 45.5 POP Bioassay Using Transgenic Plants 435
- 45.6 Prospects 437
- 45.7 Acknowledgments 437
- 45.8 References 437
- 46 Recent Developments in QuEChERS Methodology for Pesticide Multiresidue Analysis 439**  
*Michelangelo Anastassiades, Ellen Scherbaum, Bünyamin Taşdelen, Darinka Štajnbaher*
- 46.1 Introduction 439
- 46.2 Reagents 440
- 46.3 Apparatus 441
- 46.4 Procedure 442
- 46.5 Discussion 446
- 46.5.1 Improving the Recoveries of Certain Pesticides 446
- 46.5.2 Improving Selectivity 450
- 46.5.3 Expanding the Commodity Spectrum Covered by QuEChERS 453
- 46.6 Measurement 456
- 46.7 Validation 457
- 46.8 Conclusion 457
- 46.9 Acknowledgment 458
- 46.10 References 458
- 47 Summary of Scientific Programs in 11<sup>th</sup> IUPAC International Congress of Pesticide Chemistry 459**  
*Hisashi Miyagawa, Isao Ueyama*
- 47.1 Introduction 459

47.2	Plenary Lectures	459
47.3	Session Lectures and Special Workshops	460
47.4	Poster Session	472
47.5	Luncheon and Evening Seminars	474
47.6	Other Scientific Programs	477
47.7	Acknowledgments	477

**Appendix** 479

**Author Index** 485

**Subject Index** 489



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