



Insecticide Resistance Action Committee

www.irac-online.org

Insecticide Resistance Management

Further Reading

Issued, May 2010

Version 1.3

Prepared by: IRAC Communication & Education WG

Further Reading List

1. IRAC

IRAC (multi-authored), *Prevention and management of insecticide resistance in vectors and pests of public health importance*. Monograph, 51pp (2006).

McCaffery A and Nauen R, The Insecticide Resistance Action Committee (IRAC): Public responsibility and enlightened industrial self interest. *Outlooks on Pest Manag.* **2:** 11-14 (2006).

Wege PJ and Leonard PK, Insecticide resistance action committee (IRAC) fruit crops spider mite resistance management guidelines. *Proc. Brighton Crop Protect. Conf. - Pest and Diseases*, 427-430 (1994).

2. Crop Protection

Insecticide mode of action

Casida J and Quistad GB, Golden age of insecticide research: past, present, or future? *Annual Rev Entomol* **43:** 1-16 (1998).

Dekeyser M, Acaricide mode of action, *Pest Manag Sci.* **61:** 103-110 (2005).

Gilbert LI, Iatrou K, Gill SS (Eds.) *Comprehensive Molecular Insect Science*, Volume 5, *Pharmacology*, Elsevier Ltd., Oxford, (2005).

Gilbert LI, Iatrou K, Gill SS (Eds.) *Comprehensive Molecular Insect Science*, Volume 6, *Control*, Elsevier Ltd., Oxford, (2005).

Ishaaya I (Ed.) *Biochemical Sites Important in Insecticide Action and Resistance*, Springer Verlag, Heidelberg, (2001).

Ishaaya I, Nauen R, Horowitz AR (Eds.) *Insecticides Design Using Advanced Technologies*, Springer Verlag, Heidelberg, (2007).

Jeschke P and Nauen R, Neonicotinoids – from zero to hero in insecticide chemistry. *Pest Manag Sci* **64:** 1084-1098 (2008).

Khambay BPS, Pyrethroid insecticides. *Pesticide Outlook* **4:** 49-54 (2002).

Nauen R and Bretschneider T, New modes of action of insecticides. *Pesticide Outlook* **12:** 241-245 (2002).

Insecticide resistance

Enayati AA, Ranson H and Hemingway J, Insect glutathione transferases and insecticide resistance. *Insect Molecular Biology* **14**: 3-8 (2005).

Feyereisen R, Evolution of insect P450's. *Biochemical Society Transactions* **34**: 1252-1255 (2006).

French-Constant RH, Darborn PJ and Le Goff G, The genetics and genomics of insecticide resistance. *TRENDS in Genetics* **20**: 163-170 (2004).

Ishaaya I (Ed.) *Biochemical Sites Important in Insecticide Action and Resistance*, Springer Verlag, Heidelberg, (2001).

Li X, Schuler MA and Berenbaum MR, Molecular mechanisms of metabolic resistance to synthetic and natural xenobiotics. *Annual Rev Entomol* **52**: 231-253 (2007).

McKenzie JA (Ed.) *Ecological and Evolutionary Aspects of Insecticide Resistance*. Austin, TX: RG Landes, Academic Press, (1996).

Nauen R and Denholm I, Resistance of insect pests to neonicotinoid insecticides: current status and future prospects. *Arch Insect Biochem. Physiol.* **58**: 200-215 (2005).

Roush, R. T. and Tabashnik, B.E. (Eds.) *Pesticide Resistance in Arthropods*. Chapman and Hall, New York and London (1990).

Sjut V (Ed.), *Molecular Mechanisms of Resistance to Agrochemicals*. Vol 13, Springer-Verlag Berlin Heidelberg, (1997).

Soderlund DM, Pyrethroids, knockdown resistance and sodium channels. *Pest Manag Sci* **64**: 610-616 (2008).

Resistance management

Caprio MA ., Evaluating resistance management strategies for multiple toxins in the presence of external refuges. *J. Econ. Entomol.* **91**: 1021-1031 (1998).

Comins H, Tactics for resistance management using multiple pesticides. *Agric. Ecosyst. Environ.* **16**: 129-148 (1986).

Curtis CF, Theoretical models of the use of insecticide mixtures for the management of resistance. *Bull. Entomol. Res.* **75**: 259-265 (1985).

Denholm I and Rowland MW, Tactics for managing pesticide resistance in arthropods: theory and practice. *Annual Rev Entomol* **37**: 91-112 (1992).

Denholm I, Pickett JA , Devonshire AL (Eds.), *Insecticide Resistance: From Mechanisms to Management*. CABI Publishing, Wallingford, UK (1999).

Georghiou GP, Saito T (Eds.) *Pest Resistance to Pesticides*. Plenum Press, New York and London, (1983).

Hemingway J, Penilla PR, Rodriguez AD, James BM, Edge W, Rogers H, et al., Resistance management strategies in malaria vector mosquito control. A large-scale field trial in southern Mexico. *Pestic. Sci.* **51**: 375-382 (1997).

Horowitz AR, Ishaaya I (Eds.), *Insect Pest Management, Field and Protected Crops*. Springer Verlag Berlin Heidelberg New York, (2004).

Mani GS, Evolution of resistance in the presence of two insecticides. *Genetics* **109**: 761-783 (1985).

Roush RT, Designing resistance management programs: how can you choose? *Pestic. Sci.* **26**: 423-441 (1989).

Regulatory

Anon, European and Mediterranean Plant Protection Organization Standard PP 1/213(2) Resistance Risk Analysis. *Bull. OEPP/EPPO Bull.* **33**: 37-63 (2003).

Bielza P, Denholm I et al., Declaration of Ljubljana. *Outlooks on Pest Management* **19(6)**: 246-248 (2008).

Heimbach U, Kral G and Niemann P, EU regulatory aspects of resistance risk assessment. *Pest Manag. Sci.* **58**: 935-938 (2002).

Leonard PK, There has never been a better time or a greater need for resistance management. *Pestic. Sci.* **51**: 387-390 (1997).

Leonard PK and Dutton R, What impact will EPPO's new resistance risk assessment guideline have on selection pressure in the European Union *Pest Manag. Sci.* **58**: 939-943 (2002).

McNamara DG, Resistance risk analysis. *Bull. OEPP/EPPO Bull.* **31**: 363-365 (2001).

Nauen R, Leadbeater A and Thompson A, Proposal on the Revision of EU Directive 91/414, *Outlooks on Pest Management* **19(4)**: 150-1 (2008).

3. Biotechnology

General

Bates SL, Zhao J-Z, Roush RT and Shelton AM, Insect resistance management in GM crops: Past, present and future. *Nature Biotech.* **23**: 57-62 (2005).

Carozzi N and Koziel M (Eds.), *Advances in insect control: The role of transgenic plants*. Taylor and Francis, London and Bristol, PA, USA (1997).

Metz M (Ed.), *Bacillus thuringiensis: A cornerstone of modern agriculture*. Food Products Press, Binghampton, NY, USA (2003).

Mode of Action

Aronson AI and Shai Y, Why *Bacillus thuringiensis* insecticidal toxins are so effective: Unique features of their mode of action. 2001. *FEMS Microbiol. Lett.* **195**: 1-8 (2001).

Bravo A, Gomez I, Conde J, Munoz-Garay C, Sanchez J, Miranda R, Z h u a n g M, Gill SS and Soberon M, Oligomerization triggers binding of a *Bacillus thuringiensis* cry1Ab pore-forming toxin to aminopeptidase N receptor leading to insertion into membrane microdomains. *Biochim. Biophys. Acta* **1667**: 38-46 (2004).

Gill SS, Cowles EA and Pietrantonio PV, The mode of action of *Bacillus thuringiensis* endotoxins. *Annu. Rev. Entomol.* **37**: 615-636 (1992).

Schnepf E, Crickmore N, Van Rie J, Lereclus D, Baum J, Feitelson J, Zeigler D.R and Dean DH, *Bacillus thuringiensis* and its pesticidal crystal proteins. *Microbiol. Molec. Biol. Rev.* **62**: 775-806 (1998).

Mechanisms and genetics of resistance

Ferre J and Van Rie, J, Biochemistry and genetics of insect resistance to *Bacillus thuringiensis*. *Annu. Rev. Entomol.* **47**: 501-533 (2002).

Griffitts JS and Aroian RV, Many roads to resistance: How invertebrates adapt to Bt toxins. *Bioessays* **27**:614-624 (2005).

Tabashnik BE, Liu Y-B, Malvar T, Heckel DG, Masson L and Ferre J, Insect resistance to *Bacillus thuringiensis*: uniform or diverse. *Phil. Trans. R. Soc. Lond. B* **353**: 1751-1756 (1998).

Resistance Management

Gould F, Sustainability of transgenic insecticidal cultivars: Integrating pest genetics and ecology. *Ann. Rev. Entomol.* **15**: 11-23 (1998).

MacIntosh SC, Managing the risk of insect resistance to transgenic insect control traits: practical approaches in local environments. *Pest Manag Sci* (in press); (www.interscience.wiley.com) DOI 10.1002/ps.1854

Roush RT, Managing resistance to transgenic crops. In *Advances in insect control: The role of transgenic plants*. Eds: N. Carozzi and M. Zoziel. Taylor and Francis, London, pp 271-294 (1997).

Roush RT, Two-toxin strategies for management of insecticidal transgenic crops: Can pyramiding succeed where pesticide mixtures have not? *Phil. Trans. R. Soc. Lond. B* **353**: 1777-1786 (1998).

Tabashnik BE, Delaying insect adaptation to transgenic crops: Seed mixtures and refugia reconsidered. *Proc. R. Soc. Lond. B* **255**: 7-12 (1994).

Zhao J-Z, Cao J, Li Y, Collins HL, Roush RT, Earle ED and Shelton AM, Transgenic plants expressing two *Bacillus thuringiensis* toxins delay insect resistance evolution. *Nature Biotech.* **21**: 1493-1497 (2003).

4. Public Health

Hemingway J and Ranson H, Insecticide resistance in insect vectors of human disease. *Ann Rev Entomol* **45**: 371-391 (2000).

Brogdon WG and McAllister JC, Insecticide resistance and vector control. *Emerging Infectious Diseases* **4**: 605-613 (1998).

Liu N, Xu Q, Zhu F and Zhang L, Pyrethroid resistance in mosquitoes. *Insect Science* **13**: 159-166 (2006).

Hemingway J, Hawkes NJ, McCarroll L and Ranson H, The molecular basis of insecticide resistance in mosquitoes. *Insect Biochem Mol Biol* **34**: 653-665 (2004)
Nauen R, Insecticide resistance in disease vectors of public health importance. *Pest Manag Sci* **63**: 628-633 (2007).

Catteruccia F, Malaria vector control in the third millennium: progress and perspectives of molecular approaches. *Pest Manag Sci* **63**: 634-640 (2007).

Weill M, Lutfalla G, Mogensen K, Chandre F, Berthomieu A, Berticat C, et al., Insecticide resistance in mosquito vectors. *Nature* **423**: 137-138 (2003).

Enayati AA and Hemingway J, Pyrethroid insecticide resistance and treated bednets efficacy in malaria control. *Pestic Biochem Physiol* **84**: 116-126 (2006).

Hemingway J, Beaty BJ, Rowland M, Scott TW and Sharp L, The Innovative Vector Control Consortium: improved control of mosquito-borne diseases. *Trends in Parasitology* **22**: 308-312 (2006).

Cui F, Raymond M and Qiao C-L, Insecticide resistance in vector mosquitoes in China. *Pest Manag Sci* **62**: 1013-1022 (2006).

Hemingway J, Penilla PR, Rodriguez AD, James BM, Edge W, Rogers H, et al., Resistance management strategies in malaria vector mosquito control. A large-scale field trial in southern Mexico. *Pestic Sci* **51**: 375-382 (1997).

Zaim M and Guillet P, Alternative insecticides: an urgent need. *Trends in Parasitology* **18**: 161-163 (2002).

David J-P, Strode C, Vontas J, Nikou D, Vaughan A, Pignatelli PM, et al., The *Anopheles gambiae* detoxification chip: A highly specific microarray to study metabolic-based insecticide resistance in malaria vectors. *Proc Natl Acad Sci USA* **102**: 4080-4084 (2005).

Ranson H, Cladanos C, Ortelli F, Abgrall C, Hemingway J, Sharakhova MV, et al., Evolution of supergene families associated with insecticide resistance. *Science* (Washington) **298**: 179-181 (2002).

Vontas J, Blass C, Koutsos AC, David J-P, Kafatos FC, Louis C, et al., Gene expression in insecticide resistant and susceptible *Anopheles gambiae* strains constitutively or after insecticide exposure. *Insect Mol Biol* **14**: 509-516 (2005).

Coleman M, Sharp B, Seocharan I and Hemingway J, Developing an evidence-based decision support system for rational insecticide choice in the control of African malaria vectors. *J Med Entomol* **43**: 663-668 (2006).