

害虫对转 Bt 棉的抗性与监测

刘凤沂, 何月平, 须志平, 沈晋良*

(南京农业大学农业部病虫监测与治理重点开放实验室, 植物保护学院农药科学系, 南京 210095)

摘要: 全面介绍了转 Bt 棉靶标害虫的抗性遗传、机理、检测及抗性进展情况, 提出了抗性监测的重要性, 可为害虫抗性治理提供参考。

关键词: 转 Bt 棉; 害虫; 棉铃虫; 抗性

中图分类号: S435.622

文献标识码: A

文章编号: 1000-632X (2007)03-0005-04

参考文献:

- [1] TABASHNIK B E, Timothy J, Dennehy T J, et al. Delayed resistance to transgenic cotton in Pink Bollworm[J]. PNAS, 2005, 102 (43): 15389-15393.
- [2] TABASHNIK B E, Robert W R. High-level resistance to *Bacillus thuringiensis* toxin Cry1Ac and cadherin genotype in Pink Bollworm [J]. J Econ Entomol, 2006, 99: 2125-2131.
- [3] 周晓梅, 沈晋良. 棉铃虫对转 Cry1Ac 基因棉的抗性遗传及 AFLP 标记研究[J]. 棉花学报, 2005, 17(5): 269-274.
- [4] XU X J, Yu L Y, Wu Y D. Disruption of a Cadherin gene associated with resistance to Cry1Ac-endotoxin of *Bacillus thuringiensis* in *Helicoverpa armigera* [J] Appl and Environ Microbiol, 2005, 71(2): 948-954.
- [5] BURD A D, Gould F, Bradley J R, et al. Estimated frequency of non-recessive Bt resistance genes in bollworm, *Helicoverpa zea* (Boeldie) (Lepidoptera: Noctuidae) in eastern North Carolina[J]. J Econ Entomol, 2003, 96(1): 137-142.
- [6] SAYYED A H, Gatsi R, Ibiza-palacios M S, et al. Common, but complex, mode of resistance of *Plutella xylostella* to *Bacillus thuringiensis* toxins Cry1Ab and Cry1Ac[J]. Appl and Environ Microbiol, 2005, 71(11): 6863-6869.
- [7] RAHMAN M M, Roberts H L, Sarjan M, et al. Induction and transmission of *Bacillus thuringiensis* tolerance in the flour moth *Ephesia kuehniella* [J]. Proc Natl Acad Sci USA, 2004, 101: 2696-2699.
- [8] GRIFFITTS J S, Aroian R V. Many roads to resistance: how invertebrates adapt to Bt toxins[J]. BioEssays, 2005, 27: 614-624.
- [9] AGRAWAL N, Malhotra P, Bhatnagar R K. Interaction of gene-cloned and insect cell-expressed aminopeptidase N of *Spodoptera litura* with insecticidal crystal protein Cry1C[J]. Appl Environ Microbiol, 2002, 68: 4583-4592.
- [10] GILL M, Ellar D. Transgenic Drosophila reveals a functional *in vivo* receptor for the *Bacillus thuringiensis* toxin Cry1Ac1[J]. Insect Mol Biol, 2002, 11: 619-625.
- [11] GOMEZ I, Dean D H, Bravo A, et al. Molecular basis for *Bacillus thuringiensis* Cry1Ab toxin specificity: two structural determinants in the Manduca sexta Bt-R1 receptor interact with loops alpha-8 and 2 in domain II of Cry1Ab toxin[J]. Biochemistry, 2003, 42: 10482-10489.
- [12] GAHAN L J, Gould F, Heckel D G. Identification of a gene associated with Bt resistance in *Heliothis virescens* [J]. Science, 2001, 393: 857-860.
- [13] MORIN S, Biggs R W, Sisterson M S, et al. Three cadherin alleles associated with resistance to *Bacillus thuringiensis* in Pink Bollworm[J]. PNAS, 2003, 100: 5004-5009.
- [14] TABASHNIK, B E, Robert W. Biggs R W, et al. Association between resistance to Bt cotton and cadherin genotype in Pink Bollworm[J]. J Econ Entomol, 2005, 98(3): 635-644.
- [15] JURAT-FUENTES J L, Adang M J. Characterization of a Cry1Ac receptor alkaline phosphatase in susceptible and resistant *Heliothis virescens* larvae[J]. Eur J Biochem, 2004, 271: 3127-3135.
- [16] GRIFFITTS J S, Aroian R V. Many roads to resistance: how invertebrates adapt to Bt toxins[J]. BioEssays, 2005, 27: 614-624.
- [17] GRIFFITTS J S, Haslam S M, Yang T, et al. Glycolipids as receptors for *Bacillus thuringiensis* crystal toxin[J]. Science, 2005, 307: 922-925.
- [18] GUNNING R V, Dang H T, Kemp F C, et al. New resistance mechanism in *Helicoverpa armigera* threatens transgenic

- crops expressing *Bacillus thuringiensis* Cry1Ac Toxin[J]. *Appl and Environ Microbiol*, 2005, 71(5):2558-2563.
- [19] WU K M, Guo Y Y. Resistance monitoring of *Helicoverpa armigera* (Lepidoptera: Noctuidae) to *Bacillus thuringiensis* insecticide protein in china[J]. *J Econ Entomol*, 2002, 95(4):826-831.
- [20] 何丹军, 沈晋良, 周威君, 等. 应用单雌系 F₂ 代法检测棉铃虫对转 Bt 基因棉抗性等位基因的频率[J]. *棉花学报*, 2001, 13 (2) ; 105-108.
- [21] LI G P, Wu K M, Fred Gould, et al. Frequency of Bt resistance genes in *Helicoverpa armigera* populations from the Yellow River cotton-farming region of China[J]. *The Netherlands Entomol Society Entomologia Experimentalis et Applicata*, 2004, 112: 135-143.