Detection of Genetically Modified Crops by Combination of Multiplex PCR and Low-density DNA Microarray[1]

PING-PING ZHOU[*,◇], JIAN-ZHONG ZHANG[◇,2], YUAN-HAI YOU[◇], AND YONG-NING WU[*,2]

[*]*National Institute for Nutrition and Food Safety, Chinese Center for Disease Control and Prevention, Beijing 100050, China;* [◇]*National Institute for Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing 102206, China*

Objective To develop a technique for simultaneous detection of various target genes in Roundup Ready soybean by combining multiplex PCR and low-density DNA microarray. **Methods** Two sets of the multiplex PCR system were used to amplify the target genes in genetically modified (GM) soybean. Seventeen capture probes (PCR products) and 17 pairs of corresponding primers were designed according to the genetic characteristics of Rroundup Ready soybean (GTS40-3-2), maize (Mon810, Nk603, GA21), canola (T45, MS1/RF1), and rice (SCK) in many identified GM crops. All of the probes were categorized and identified as species-specific probes. One negative probe and one positive control probe were used to assess the efficiency of all reactions, and therefore eliminate any false positive and negative results. After multiplex PCR reaction, amplicons were adulterated with Cy5-dUTP and hybridized with DNA microarray. The array was then scanned to display the specific hybridization signals of target genes. The assay was applied to the analysis of sample of certified transgenic soybean (Roundup Ready GTS40-3-2) and canola (MS1/RF1). **Results** A combination technique of multiplex PCR and DNA microarray was successfully developed to identify multi-target genes in Roundup Ready soybean and MS1/RF1 canola with a great specificity and reliability. Reliable identification of genetic characteristics of Roundup Ready of GM soybean from genetically modified crops was achieved at 0.5% transgenic events, indicating a high sensitivity. **Conclusion** A combination technique of multiplex PCR and low-density DNA microarray can reliably detect and identify the genetically modified crops.

Key words: Genetically modified organisms; Low-density DNA microarray; Multiplex PCR; Roundup Ready soybean; MS1/RF1 canola

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[2]Correspondence should be addressed to Professor Yong-Ning WU and Professor Jian-Zhong ZHANG. Tel: 86-10-83132933, 86-10-61739456. Fax: 86-10-83132933. E-mail: wuyn@public.bta.net.cn or Helico99@sina.com

Biographical note of the corresponding author: Yong-Ning WU, male, born in 1962, Ph. D., professor, majoring in food safety. Jian-Zhong ZHANG, male, born in 1964, Ph. D., professor, majoring in molecular microbiology.

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