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The Effect on Gene Flow from GM to Non-GM Rices by Heading Date Difference

Doh-Won Yun[1]*, Sung-Dug Oh[1], Sung-Gon Lee[1], Gang-Sub Lee[1]

[1]Department of Agricultural Biotechnology, National Institute of Agricultural Sciences, Jeonju, Korea

Genetically modified (GM) crops have been increased continuously over the world and concerns about the potential risks of GM crops have also been increasing. Even though GM crops have not been cultivated commercially in Korea, it is necessary to develop technology for safety assesment of GM crops. In this study, we investigated the influence of heading date difference on gene flow from GM to non-GM rice. In the experimental design, The PAC gene GM rice was placed in the center as a pollen donor and non-GM rice were placed in eight directions as pollen receivers. Five pollen receiver rice cultivars were Unkawng, Daebo, Saegyejinmi, Nakdong, and Ilmi which had different flowering times. A total of 266,436, 300,237, 305,223, 273,373, and 290,759 seeds were collected from Unkawng, Daebo, Saegyejinmi, Nakdong, and Ilmi, respectively, which were planted around PAC GM rice. The GM×non-GM hybrids were detected by repeated spraying of herbicide and PAT immunostrip assay. Finally, the hybrids were confirmed by PCR analysis using PAC gene specific primer. The hybrids were found in Nakdong which had the same heading date with PAC GM rice. The hybridization rate was 0.0007% at Nakdong. All of GM×non-GM hybrids were located within 2 m distance from the PAC rice zone. The physiological elements including rice heading date were found to be important factors to determine GM rice out crossing rate. Consideration should be taken for many factors like the physiological elements of field heading date of rice cultivars to set up the safety management guideline for prevention of GM rice gene flow.

*Corresponding author: Tel. +82-63-238-4713, E-mail. dwyun@korea.kr