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Environmental Evaluation of GM Hot Pepper in Newly Synthesized Material Differences

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We made genetically modified (GM) hot peppers that are herbicide-resistant. To register them for field use, we demonstrated their biosafety by environmental evaluations. We here report substantial equivalence between GM and non-GM hot peppers with respect to extracted and volatilized organic compounds. We compared organic compounds extracted from leaves, stems, roots of herbicide-resistant and wild type (Subicho) peppers. Herbicide resistant-pepper evolved the same coumpounds and patterns in GC-MS and HPLC analysis. Both types of plants had no detectable differences in organic compounds. Volatile organic compounds from leaves and stems were also similar, although some small variations were detected. All of detected material had no known toxicity or allergic effects. We conclude that there are no differences between GM and Non-GM peppers. These results will be used for environmental toxicity evaluation, allowing cultivation of herbicide-resistance GM peppers.

Concerns about environmental effects force developers of GMOs to demonstrate the safety of GMOs for their cultivation. As a consequence, several environmental evaluation tests have to be conducted. For this evaluation, several issues were considered, including impact,environmental circumstances such as horizontal transfer of genes, morphological changes, cultivation conditions, and toxicity for living organisms. In this report, we evaluated differences in synthesized materials between GM and non-GM, with the aim of demonstrating the biosafety of GM plants.

We designed herbicide-resistant GM hot peppers for cultivation in field. We proved biosafety of the GM plant aspects by metabolic profiling. Herbicide resistant pepper and control peppers (Subicho) were compared. Each sample was ground and eluted in various solvent conditions. Concentrate extract samples (1µl each) were injected into chromatographs. HPLC and GC/MS analysis conditions are listed below.

Volatile and secreted materials from plants were analyzed by HPLC. Evolved materials were identified by GC/MS.

Fig 1. shows the analysis of excreted materials from the roots. HPLC detected few differents peaks. Their differences was identified by GC/MS (Table 1). Small differences were detected and were not significant.

Analyses of stems, leaves and fruits also yielded similar results. All of evolved materials were similar. Although some differences were detected in the excreted materials, they were similar. Fig 2 shows material patterns of leaves.

We conclude that there are no special differences between GM and Non-GM peppers. Alhough, some of differences were detected, they may be explained by experimental errors. These results will be used for environmental toxicity evaluation of permitting the cultivation of herbicide-resistance GM pepper.

TABLE 1. GC/MS identification of different materials from HPLC.

Peak#	GM	Non-GM
1	Thujyl alcohol	Cyclohexene
2	Thujyl alcohol	Thujyl alcohol
3	Cyclohexene	Cyclohexene

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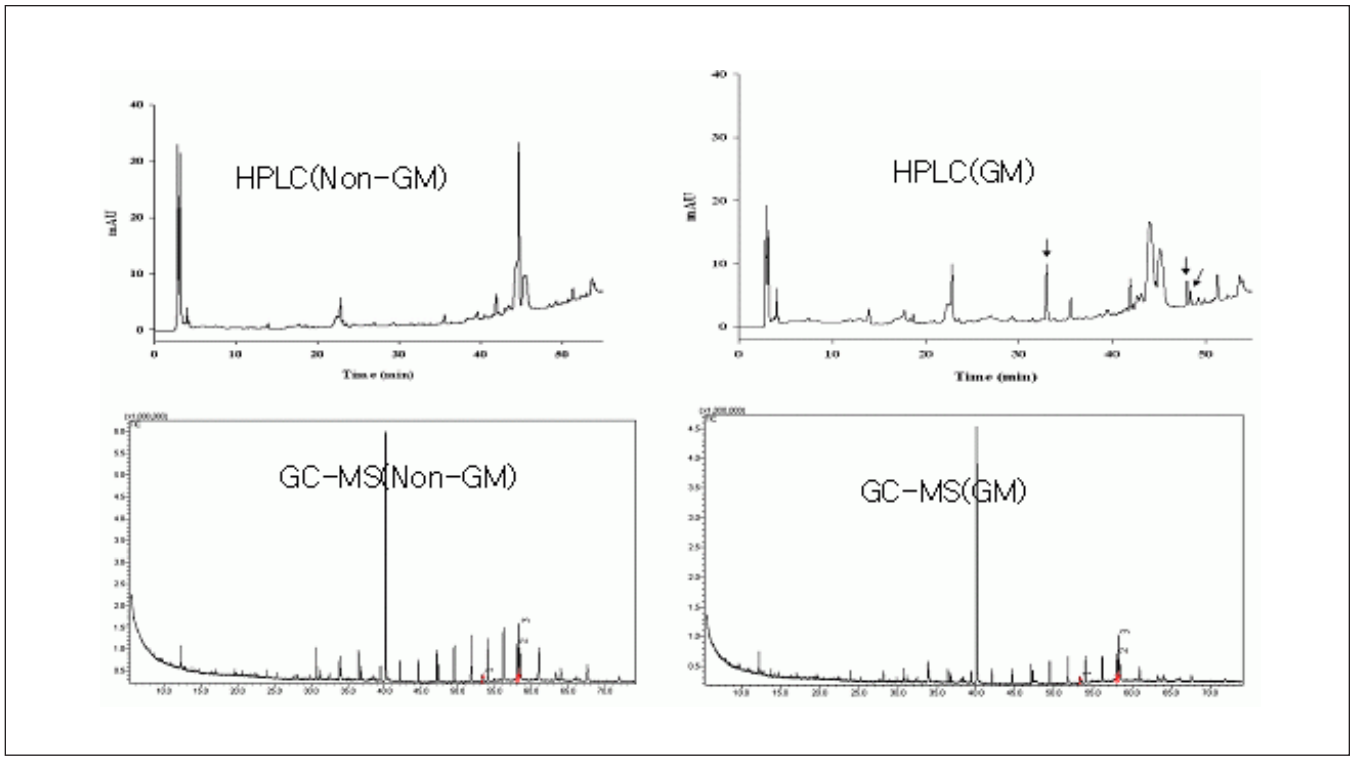

FIG 1. Analysis of secreted compounds from Hot pepper roots.

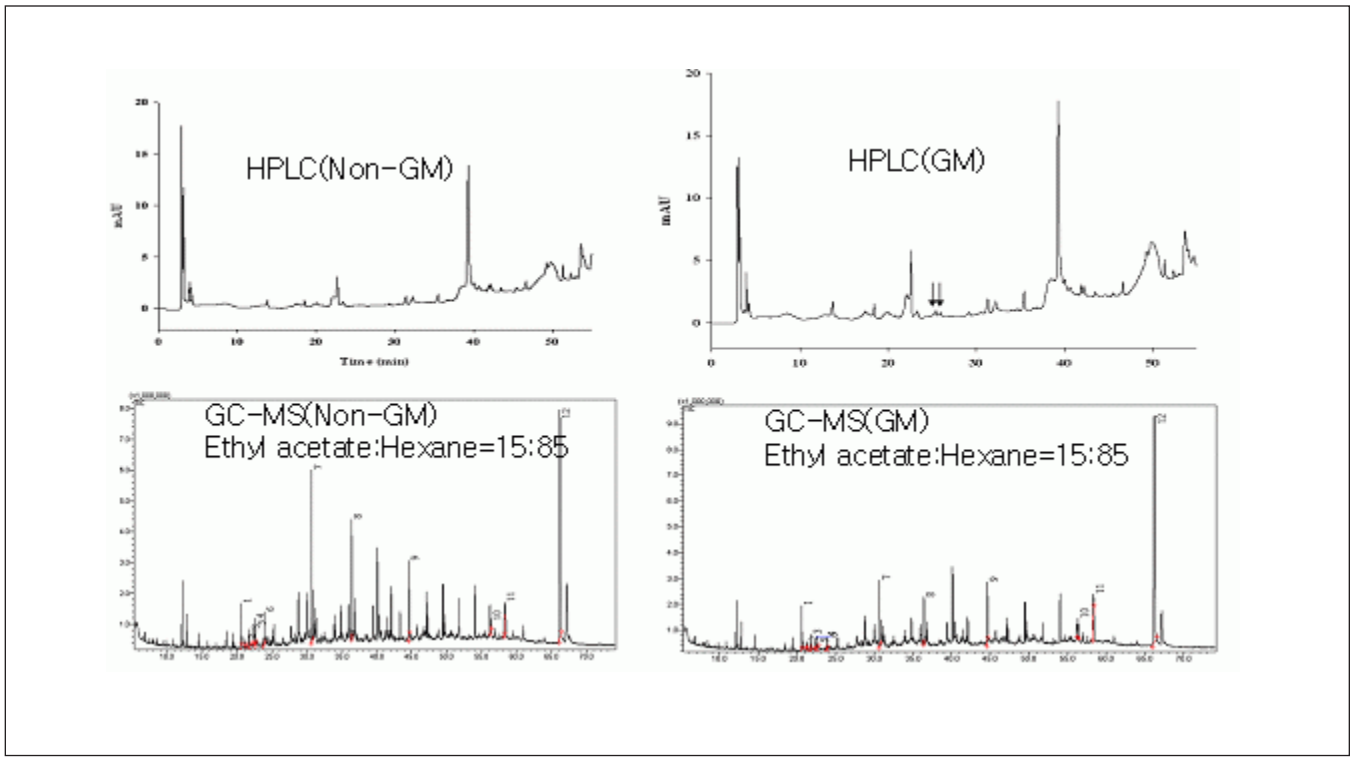

FIG 2. Analysis diagrams of HPLC and GC/MS in GM and Non-GM pepper.