

Purification of DNA from Food Materials for Detection of Genetically Modified Organisms (GMOs) Using the MasterPure™ DNA Purification Kit

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Introduction

There is worldwide debate concerning the safety and desirability of planting and consuming genetically modified foods (GMOs). As a consequence, the number and importance of rapid and cost-effective GMO testing processes have grown significantly. PCR is now the standard process for analyzing food materials for the presence of GMOs. However, a standard method for preparing DNA from a wide variety of food-stuffs is needed to establish a standardized GMO testing program.¹ Here, we show that the MasterPure™ DNA Purification Kit provides a rapid, reproducible, and cost-efficient method for DNA extraction from food and plant materials for GMO testing without the use of hazardous chemicals, columns or resins.

Materials and Methods

An overview of the MasterPure DNA purification process is shown in Figure 1. Commercial food samples were purchased locally. Fifty mg of solid or 150 µl of liquid samples were extracted in duplicate using the MasterPure DNA Purification Kit according to the standard kit protocol. Using the MasterPure Kit, PCR-ready DNA was purified in 45 minutes or less from each sample. DNA yields were measured by fluorimetry with calf thymus DNA as a standard. Certified Reference Material soybean powders (Joint Research Centre-IRMM) were obtained from Acros Chemical

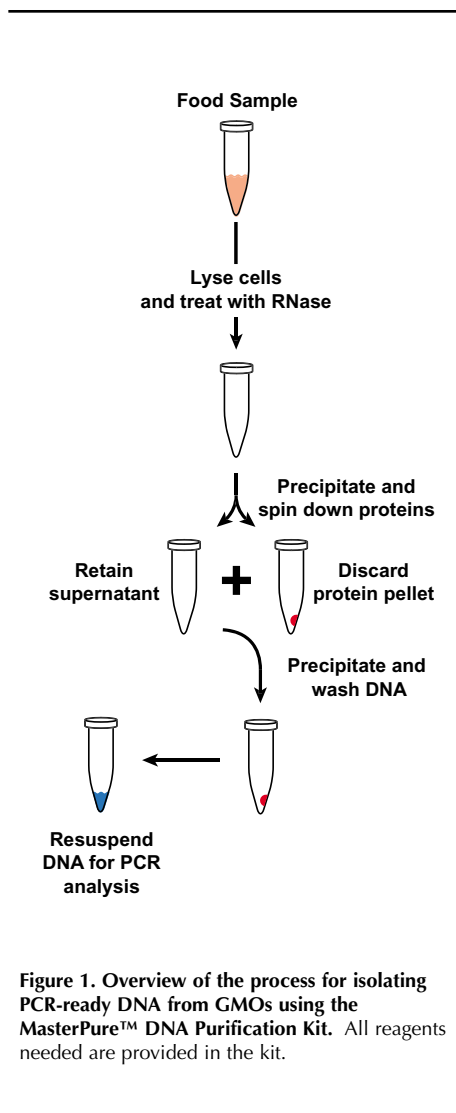


Figure 1. Overview of the process for isolating PCR-ready DNA from GMOs using the MasterPure™ DNA Purification Kit. All reagents needed are provided in the kit.

Company. PCR primers and amplification conditions specific for the commonly-used cauliflower mosaic virus (CaMV) 35S promoter and the nopaline synthetase (NOS) terminator sequences were used for detection of GMO food-stuffs.

Results and Discussion

Although the amount of DNA extracted from different food materials varied, DNA yields were highly reproducible for each sample tested (Table 1), and provided enough DNA to perform many PCR reactions for GMO analysis. In many cases, PCR products of the predicted sizes were detected for both CaMV and NOS PCR targets using the same DNA (Figure 2, lanes 2, 7 and 8). In these cases (e.g., cornmeal, soy hot dog, and corn curls), the data was very strong that the commercial products were GMOs. Some soy foods, however, were PCR-positive for CaMV, but negative for NOS (Figure 2, lanes 3 and 5). This result could occur if a non-GMO plant had been infected with CaMV or a closely-related virus or if the product is a GMO but a terminator sequence different than NOS was used.

In summary, the MasterPure DNA Purification Kit has been shown to be effective in the extraction of DNA from raw and processed food for use in GMO analyses. The DNA yields are reproducible between samples of the same food material and sufficient to perform many PCR reactions.

References

- Gachet, E. *et al.* (1999) *Trends Food Sci. Technol.* 9:380.

Table 1. DNA yields and PCR results for foodstuffs using two common GMO-related targets.

Material Extracted	DNA Yield from Duplicate Samples, µg DNA	CaMV 35S Target	NOS Target
Cornmeal, commercial	4.9, 4.7	+	+
Cornmeal, organic	9.7, 8.1	+	+
Polenta, organic	1.6, 2.0	-	-
Soy milk W	0.8, 0.7	+	-
Soy milk E	0.5, 0.5	-	-
Soy protein	12.6, 12.4	+	-
Tofu	8.6, 8.4	-	-
Hot dog, soy	14.7, 11.9	+	+
Corn curl	0.3, 0.4	+	+

MasterPure™ DNA Purification Kit

MCD85201 200 Purifications

MasterPure™ Complete DNA & RNA Purification Kit

MC89010 10 Purifications

MC85200 200 Purifications

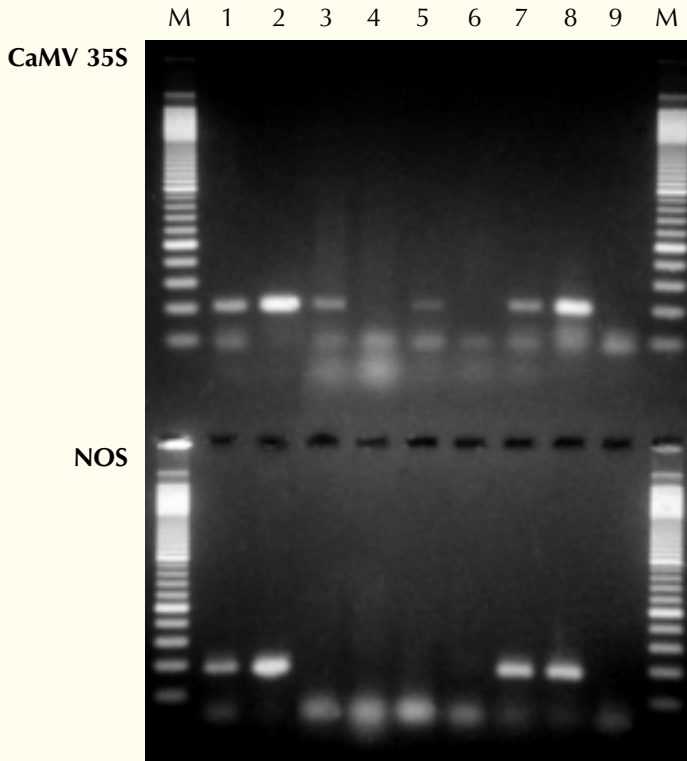


Figure 1. PCR amplification of the CaMV 35S promoter (upper gel) and NOS terminator sequences (lower gel) using genomic DNA isolated with the MasterPure™ DNA Purification Kit. Sources of DNA included Certified Reference Material soybean powder (Lane 1), commercial cornmeal (Lane 2), soy milk W (Lane 3), soy milk E (Lane 4), soy protein (Lane 5), tofu (Lane 6), soy hot dog (Lane 7), and corn curls (Lane 8). Negative control (Lane 9); M, DNA Ladder.



RiboShredder™ RNase Blend Destroys Unwanted RNA Quickly and Efficiently

EPICENTRE's RiboShredder™ is a proprietary blend of potent non-mammalian RNases that completely degrades unwanted RNA in DNA and protein purification procedures. Unlike other RNase cocktails, RiboShredder RNase completely degrades all RNA (Figure 1). RiboShredder RNase Blend uses recombinant, highly purified ribonucleases and thus does not require boiling to remove unwanted DNase activities prior to use.

Benefits

- Quickly and completely degrades RNA (Figure 1).
- Highly purified, cloned non-mammalian enzyme blend is free of contaminating DNases and proteases.

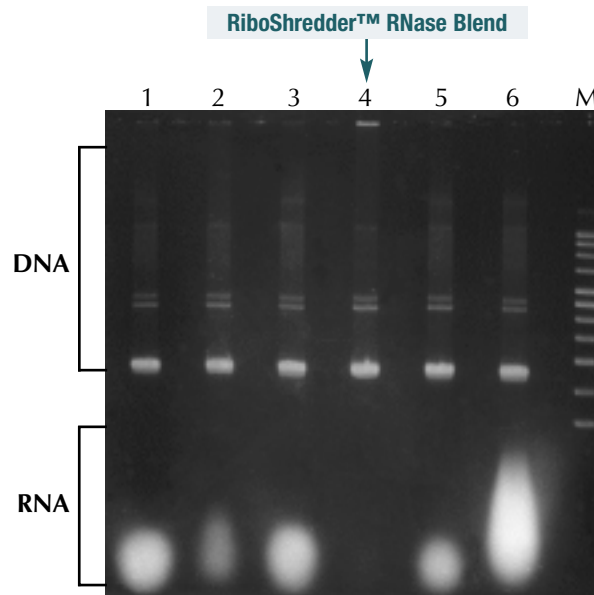


Figure 1. RiboShredder completely degrades RNA in DNA purification procedures. Nucleic acids from a standard alkaline lysis plasmid prep were treated with RiboShredder RNase individual RNases or other commercially available RNase mixtures. Lane 1, RNase A; Lane 2, RNase I; Lane 3, RNase T1, Lane 4, RiboShredder RNase Blend; Lane 5, RNase A/RNase T1 cocktail; Lane 6, Untreated alkaline lysis plasmid preparation M, Supercoiled DNA ladder.

RiboShredder™ RNase Blend

RS12100	100 Units
RS12500	500 Units