GMO analysis in food and feed

Commercially available genetically modified organisms (GMO) are usually transgenic plants in which DNA from foreign species were artificially implemented.

These DNA sequences, mostly for herbicide and/or insect resistance are enveloped in a frame of viral or bacterial DNA sequences which serves as promoters or terminators. Different international and national legislations and labelling regulations require a multi-stage analysis, for which real-time PCR is the method of choice. In October 2015, the European Network of GMO Laboratories (ENGL) defined minimum performance requirements, which are fulfilled by the SureFood® kits.

1. The presence of GMOs can be screened by identifying the genetic sequence elements 35S, NOS or FMV. Further genetic elements may be expected in the future. 35S positive results should be confirmed for absence of natural contamination with the cauliflower mosaic virus using the CaMV detection kit. Furthermore, the efficiency of the DNA preparation should be confirmed using plant DNA, when analysing a new matrix.
2. For GMO positive samples the identification of the GMO event is of main interest, to classify the food product as approved or illegal GMO. In Europe the legislation EC 1829/2003 and 1830/2003 describes the relevant regulations. Non-approved GMO products are not allowed to enter or to be produced or processed in Europe. A zero tolerance strategy is in force for Europe, while for feed samples a technical threshold of 0.1 % has been established (EC 618/2011). Food products with a content of > 0.9 % approved GMO per matrix must be labelled.
3. For approved GMOs in food samples quantification in the relevant range of approximately 0.9 % is of main interest. The GMO content in DNA copy numbers can be quantified relative to the plant matrix and the results will be given in percent.

SureFood® PREP Basic/Advanced

- Efficient, streamlined DNA sample preparation from food and feed matrices
- Highly purified DNA
- For raw and high processed food and feed samples

SureFood® GMO SCREEN

- Multiplex assay for 35S/NOS/FMV + IAC, BAR/NPTII/PAT/CTP2:CP4 EPSPS, Corn/Soya/Canola/Cotton
- Single assays for vectors

SureFood® GMO QUANT

- Identification and quantification
- Robust detection system
- Wide product range
- Suitable for most available real-time thermocyclers

GMO

DNA preparation

Product	Description	No. of tests/amount	Art. No.
DNA preparation			
SureFood® PREP Basic	DNA preparation of food and feed	100 preparations	S1052
SureFood® PREP Advanced	DNA preparation of highly processed food and feed	50 preparations	S1053
SureFast® Animal+Plant Control 3plex	Extraction control for plant or animal matrix including internal control DNA (ICD) Detection limit: ≤ 500 DNA copies depending on matrix and DNA preparation	100 reactions	F4053

Real-time PCR screening

Screening			
SureFood® GMO Plant PLUS	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2049
SureFood® GMO SCREEN CaMV	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2027
SureFood® GMO SCREEN P35S:BAR Rice	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	2 x 50 reactions	S2022
SureFood® GMO SCREEN 35S/NOS/FMV	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions*	S2026
Multiplex Screening			
SureFood® GMO SCREEN 4plex 35S/NOS/FMV + IAC	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2126
SureFood® GMO Plant 4plex Corn/Soya/Canola/Cotton	Detection limit: ≤ 4 mg/kg depending on matrix and DNA preparation	100 reactions	S2156
SureFood® GMO Plant 4plex Corn/Soya/Canola + IAC	Detection limit: ≤ 4 mg/kg depending on matrix and DNA preparation	100 reactions	S2158
SureFood® GMO SCREEN 4plex BAR/NPTII/PAT/CTP2:CP4 EPSPS	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2127

Real-time PCR – qualitative DNA detection

Canola			
SureFood® GMO ID MS8 Canola	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2062
Corn			
SureFood® GMO ID MIR162 Corn	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2035
SureFood® GMO ID MON863 Corn	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2037
Rice			
SureFood® GMO ID Bt63 Rice	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	2 x 50 reactions	S2024

* Includes additional 100 reactions of Inhibition Control Mix (ICM).

GMO

Real-time PCR – qualitative DNA detection

Soya			
SureFood® GMO ID Roundup Ready Soya	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2030
SureFood® GMO ID RR2Y Soya	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2034
SureFood® GMO ID A2704-12 Soya	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation	100 reactions	S2057
Multiplex real-time PCR			
SureFood® GMO ID 4plex Soya I	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation Events: MON87708, CV127/DP305423/MON87701/ MON87769	100 reactions	S2161
SureFood® GMO ID 4plex Canola I	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation Events: MS8/GT73/T45	100 reactions	S2166
SureFood® GMO ID 4plex Canola II	Detection limit: ≤ 5 DNA copies depending on matrix and DNA preparation Events: MON88302/DP73496/RF3	100 reactions	S2167

Real-time PCR – quantitative DNA detection

Canola			
SureFood® GMO QUANT GT73 Canola	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2061
Corn			
SureFood® GMO QUANT Bt176 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2015
SureFood® GMO QUANT Bt11 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2016
SureFood® GMO QUANT T25 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2017
SureFood® GMO QUANT MON810 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2019
SureFood® GMO QUANT 35S Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2020
SureFood® GMO QUANT NK603 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2050
SureFood® GMO QUANT MON863 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2051
SureFood® GMO QUANT MIR162 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2135
SureFood® GMO QUANT GA21 Corn	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2054
Soya			
SureFood® GMO QUANT Roundup Ready Soya	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2014
SureFood® GMO QUANT 35S Soya	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2028
SureFood® GMO QUANT RR2Y Soya	Limit of detection: ≤ 5 DNA-copies; Limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions**	S2029

** 1 x 50 reactions for the detection of the reference gene.