Since commercialization of genetically modified (gm) plants in 1996, the amount of gm crops grown worldwide has increased year by year. This becomes a major challenge for the official food/feed/seed surveillance in the European Union (EU) due to the asynchronous approval process. Gm plants need to be authorized in the EU in order to be placed on the EU market.

Food, feed and seed surveillance is currently performed by DNA analysis. In this respect, the PCR is the most common technique, allowing also a quantification of the target. However, the PCR also has disadvantages, especially when amplifying several targets in one reaction (multiplex PCR).

In this project, we developed multiplex ligation-dependent probe amplification (MLPA) assays for the simultaneous detection of gm plants, common screening elements and respective reference genes in seed. The MLPA reaction is based on the ligation of two synthetic probes binding adjacent to each other on the target DNA. The ligation product has a unique size and universal primer binding sites allow the subsequent competitive amplification using one common primer pair. The amplicons are separated and detected by capillary electrophoresis.

Species-specific modular systems for corn, rapeseed, soybean, rice and potato were designed in order to detect the most common events. Currently, 10 corn events, 3 rapeseed events, 6 soybean events, 1 rice event and 1 potato event can be simultaneously detected. Furthermore, we designed a screening module detecting the most common genetic elements in gm crops. By applying this module, 8 different genetic elements can be simultaneously detected. Probes for the detection of a specific event or genetic element can easily be added or deleted from the module, which makes the MLPA much more flexible compared to the multiplex PCR.

Keywords: Multiplex ligation dependend probe amplification, simultaneous detection, GMO, surveillance