GMO ON THE BULGARIAN MARKET – 2023

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The development of biotechnology has led to the introduction of genetically modified organisms (GMOs) into agriculture and the food industry, generating considerable interest and debate among the public. The present study is a detailed analysis of food products offered on the Bulgarian market, with the aim of establishing the presence of genetically modified organisms, which will contribute to a more objective assessment of the distribution and diversity of GMOs on the Bulgarian market in 2023.

INTRODUCTION

As the number of genetically modified organisms (GMOs) entering the market rises, testing laboratories face increased demand. Ready-to-use PCR-based detection systems, such as Pre-spotted Plates (PSP), offer a solution by reducing assay time and increasing throughput.

The optimal GMO screening strategy should aim to detect all known and pending events, minimize the need for additional testing, and potentially uncover unknown or unauthorized GM events.

The aim of this study is to conduct an unbiased examination of genetically modified organism presence in the Bulgarian market, alongside verifying if products comply with GMO labeling regulations.

MATERIALS AND METHODS

A total of 79 samples were analyzed such as soy, soy granulate, popcorn corn, waffles, various meat products, etc.

Molecular genetic methods:

▶ **DNA Extraction from food products:**

DNA extraction was performed using a Macherey-Nagel™ NucleoSpin™ Food Column from food samples, according to the manufacturer's recommendations.

▶ **Quantitative and qualitative evaluation of extracted DNA**

The quality and quantity of the extracted nucleic acid was assessed by spectrophotometric analysis (Agilent 8453 UV-Visible Spectroscopy System, Agilent Technologies) at wavelengths of 260 nm and 280 nm.

▶ **Qualitative determination of DNA by real-time PCR**

Qualitative determination of DNA by real-time PCR was performed according to the standard БДС EN ISO 21569:2005/A1:2013 Food products. Methods of analysis for the detection of genetically modified organisms and their products. Nucleic acid-based qualitative methods (ISO 21569:2005/Amd 1:2013).

In order to reduce the analysis time and increase the capacity for qualitative determination of DNA by real-time PCR, ready-to-use multi-purpose detection systems based on PCR - (PSP) are used.

▶ **DNA quantification by real-time PCR**

DNA quantification by real-time PCR was performed according to the БДС EN ISO 21570:2005/A1:2013 Food standard. Analytical methods for the detection of genetically modified organisms and genetically modified products. Quantitative methods using nucleic acid (ISO 21570:2005/Amd. 1:2013).

▶ **Statistical methods of analysis**

The primary processing of the real-time polymerase chain reaction data was done with the software product of Applied Biosystems - SDSv2.2.2.

The results were processed with Microsoft®Office Excel 2010 (Microsoft Office Professional Edition 2010). The created spreadsheets are checked for correct entry of information.

RESULTS AND DISCUSSION

79 samples were analyzed, such as corn flour, popcorn, soy protein isolate, soy granulate, sweet corn, snacks, waffles, sausages, etc. In 91% of the samples no GMO was detected, 9% were positive for various GMOs authorized in the EU (Fig. 1), but all of them were below the LOQ or content level below the threshold of 0.9% GMO content for mandatory labeling .
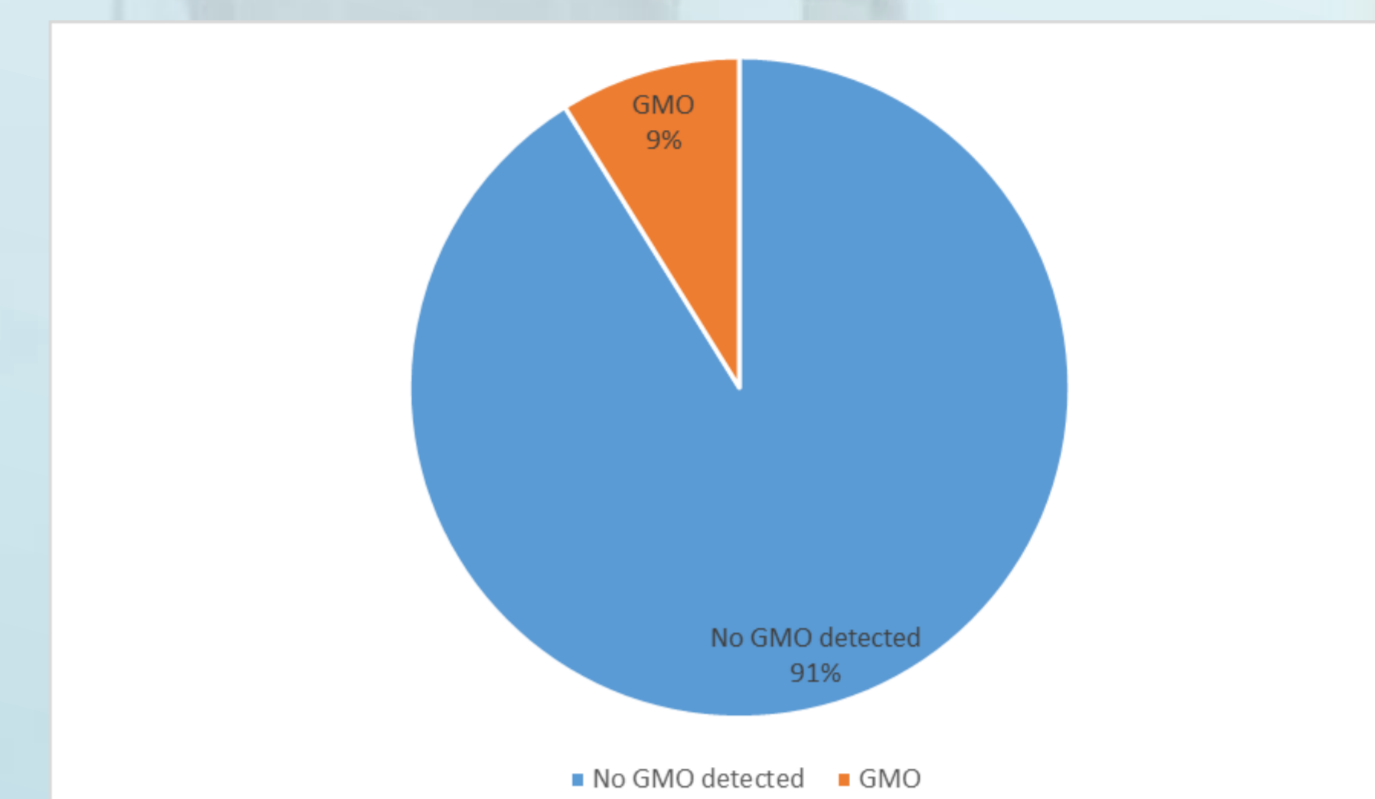

Fig. 1 Distribution of GMOs in the examined samples for 2023

Fig. 2 presents the most analyzed types of samples. Among them, 12% are soy, 10% - popcorn, 9% - minced meat and its products, 8% - soy granulate and 6% - wafers. Soybeans, corn and some ingredients in meat products are frequent targets for genetic modification, so the largest number of these types of products were analyzed.
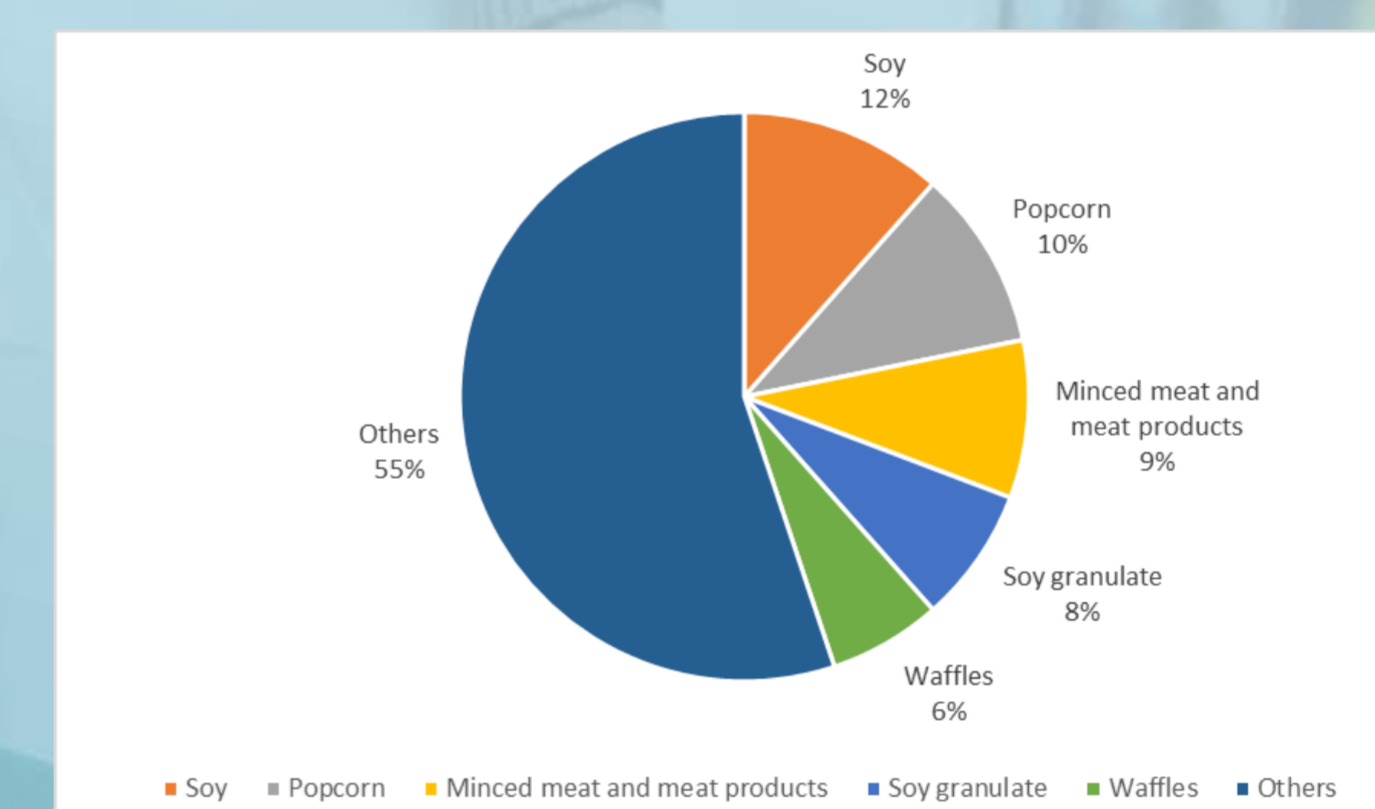

Fig. 2 Most Analyzed Sample Types 2023

A large number of different GM events were identified in the positive samples (Fig. 3), with more than 1 GM event detected in 3 of the samples. The products in which GMOs are most often found are popcorn.
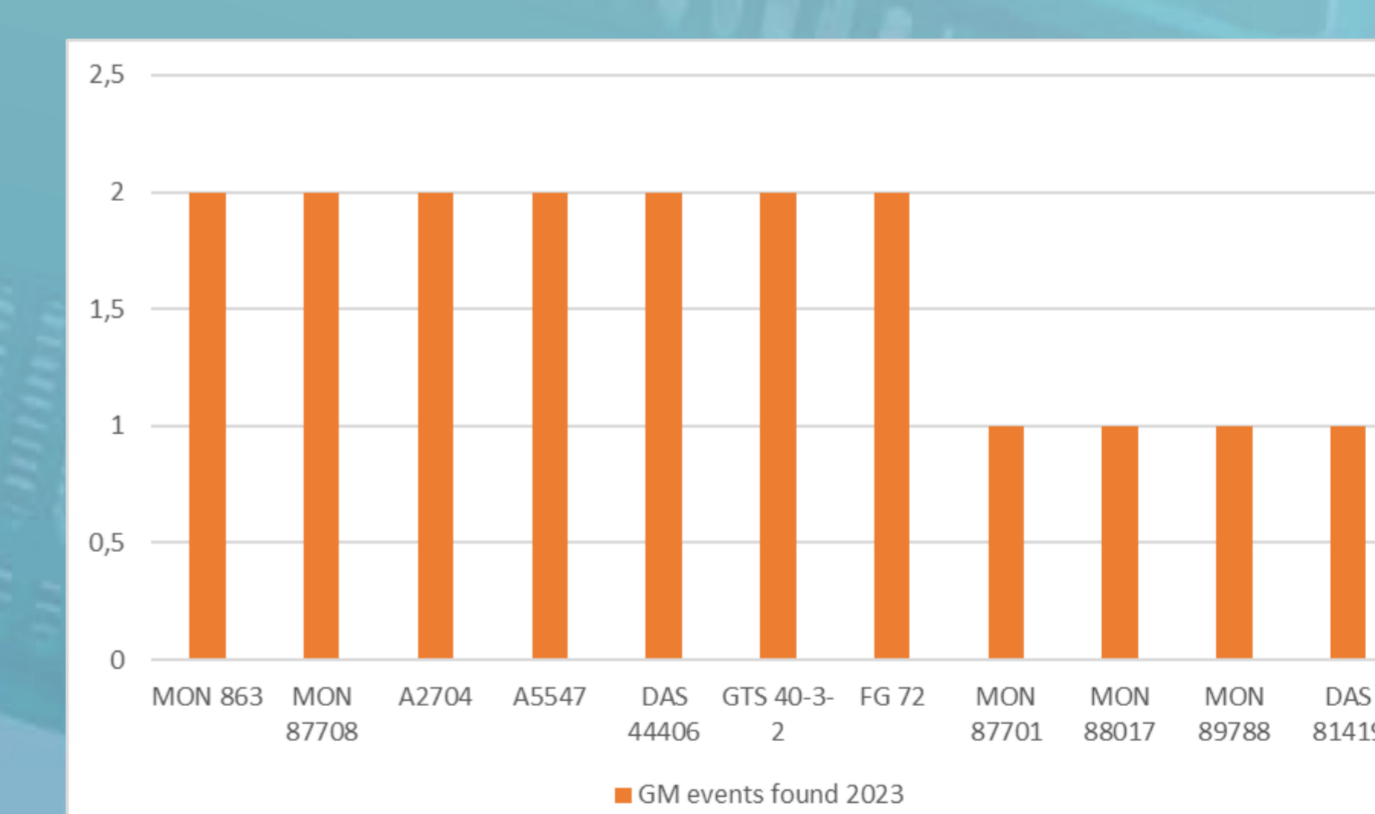

Fig. 3 GM events found 2023

All positive samples were below the LOQ or content level below the threshold of 0.9% GMO content for mandatory labeling.

The products most commonly found to be GMO are popcorn, soy protein, and soy granulate. Almost half of the products positive for GMOs are not of Bulgarian origin.

CONCLUSION

The results showed that only 9% of the food products tested contained GMOs, but all were below the threshold for mandatory labeling. In other words, 91% of the samples didn't have GMOs.

While the overall percentage of positive samples with GMOs was low, we noticed an increase in the types of genetically modified events detected. This aligns with findings from studies in other European countries.

Using pre-prepared testing kits helped us save time and money in identifying GMOs in food. These systems could also be useful for detecting allergens, among other things.