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Current Trends in Toxin Analysis of Agricultural Products: Improving the Food Safety with the Help of Biotechnologies

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Food safety has become an extremely important problem for modern society. With increasing pollution of agricultural products with various toxic compounds, the need for technological control and consumer health protection has increased [1]. Therefore, new methods for sensitive and rapid on-site detection of toxic contaminants in food and agricultural products are required. The aim of this thematic issue is to carry out the detection of various toxic contaminants in food and agricultural products, and also the development of new sensitive methods for their detection. Pathogenic microorganisms such as *Aspergillus flavus*, *Fusarium langsethia*, and *Staphylococcus aureus* and their toxic metabolite compounds – aflatoxins, T-2 toxins, and enterotoxins, respectively, are present in agricultural products and are dangerous for human health [2]. Furthermore, pathogenic microorganisms cause mastitis in cows. During the onset of mastitis, neutrophils get activated, attracted and attempt to kill the invading pathogens [3]. Studying the role of neutrophils in the infection and its subsequent effect on some of the milk quality parameters is a very important task. Also, organophosphorus pesticides play an important role in agriculture, but they are very toxic compounds and they need constant monitoring [4]. The necessity of wide screening control of food and agriculture contamination is due to the widespread distribution and the significant and multiple toxic effects of these toxic compounds. The high toxicity of these toxins requires accurate and reliable detection methods for safety food, agricultural products and water. It is necessary to develop rapid and sensitive assays for the determination of low concentrations of these toxic compounds. Therefore, different new sensitive methods for the determination of the mentioned toxins are presented in this thematic issue. All the proposed assays are based on an immunoreaction antibody-antigen that is highly specific and sensitive [5]. A rapid and sensitive fluorescent immunoassay based on Magnetic Nanoparticles (MNPs) with a polyclonal and monoclonal antibody for determination of enterotoxin A

and an MNP-based enzyme-linked immunosorbent assay (ELISA) for simultaneous determination of two pesticides in milk have been developed. The use of MNPs led to the development of integrated methods that provide a better assay sensitivity (pg/ml), rapid analysis and simple washing procedures [6]. In the thematic issue, schemes for immunochromatographic analysis of aflatoxin B1 and T2 toxin are proposed. There, the separation of the stage of specific interaction and the stage of introduction of the labeled conjugate allows reducing the concentration of specific antibodies and increasing the sensitivity of the analysis. It is shown that indirect labeling in the analysis of mycotoxins increased the sensitivity up to 20 times compared with the traditional scheme systems for aflatoxin B1 and T2 toxin. The QCM immunosensors for the detection of aflatoxin B1 in low concentrations are also proposed. The advantage of QCMs over other endpoint measuring tools is their ability to make real-time measurements. The study of various toxic contaminants in food and agricultural products and the development of new sensitive methods for their detection will lead to quality assurance of food and its safety.

The guest editor firmly believes that the collection of papers in this special issue will be of interest and useful to the research community.

CONFLICT OF INTREST

The authors declare no conflict of interest, financial or otherwise.

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