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Methods of Detoxification of Nuts With Aflatoxin B1 Contamination

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Abstract : In order to find and select detoxification methods, patent and information research was conducted, as a result of which 68 patents for inventions were found, among them from the near abroad - 14 (Russia), from far abroad: China – 27, USA - 6, South Korea–1, Germany - 2, Mexico – 4, Yugoslavia – 7, Austria, Taiwan, Belarus, Denmark, Italy, Japan, Canada for 1 security document. Aflatoxin B_1 in various nuts was determined by two methods: enzyme immunoassay "RIDASCREEN ® FAST Aflatoxin" with determination of optical density on a microplate spectrophotometer RIDA®ABSORPTION 96 with RIDASOFT® software Win.NET (Germany) and the method of high-performance liquid chromatography (HPLC Corporation Water, USA) according to GOST 307112001. For experimental contamination of nuts, the cultivation of strain A was carried out. flavus KWIK-STIK on the medium of Chapek (France) with subsequent infection of various nuts (peanuts, peanuts with shells, badam, walnuts with and without shells, pistachios).Based on our research, we have selected 2 detoxification methods: method 1 – combined (5% citric acid solution + microwave for 640 W for 3 min + UV for 20 min) and a chemical method with various leaves of plants: Artemisia terra-albae, Thymus vulgaris, Callogonum affilium, collected in the territory of Akmola region (Artemisia terra-albae, Thymus vulgaris) and Western Kazakhstan (Callogonum affilium). The first stage was the production of ethanol extracts of Artemisia terraea-albae, Thymus vulgaris, Callogonum affilium. To obtain them, 100 g of vegetable raw materials were taken, which was dissolved in 70% ethyl alcohol. Extraction was carried out for 2 hours at the boiling point of the solvent with a reverse refrigerator using an ultrasonic bath "Sapphire". The obtained extracts were evaporated on a rotary evaporator IKA RV 10. At the second stage, the three samples obtained were tested for antimicrobial and antifungal activity. Extracts of Thymus vulgaris and Callogonum affilium showed high antimicrobial and antifungal activity. Artemisia terraea-albae extract showed high antimicrobial activity and low antifungal activity. When testing method 1, it was found that in the first and third experimental groups there was a decrease in the concentration of aflatoxin B1 in walnut samples by 63 and 65%, respectively, but these values also exceeded the maximum permissible concentrations, while the nuts in the second and third experimental groups had a tart lemon flavor; When testing method 2, a decrease in the concentration of aflatoxin B1 to a safe level was observed by 91% (0.0038 mg/kg) in nuts of the 1st and 2nd experimental groups (Artemisia terra-albae, Thymus vulgaris), while in samples of the 2nd and 3rd experimental groups, a decrease in the amount of aflatoxin in 1 to a safe level was observed.

Keywords : nuts, aflatoxin B1, my, mycotoxins
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