MYCOTOXINS CONTENT IN ORGANIC AND CONVENTIONAL VEGETABLES

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Introduction

Organic farming becomes more popular, because demands for fresh and high quality vegetables and fruits are also constantly increasing. Organic products are perceived by consumers as healthier and safer for the environment. On the other hand, these products, not treated with pesticides, are supposed to be exposed to mycotoxins contamination, that are secondary metabolites, produced mainly by specific filamentous fungi. Mycotoxins present in plant products may cause immunological effects, specific organ damage or cancer in human or animals. So far, very little studies have been conducted to determine the level of mycotoxins in vegetables. Therefore, the aim of this work was to evaluate the quality of organic and conventional vegetables based on mycotoxins concentration.

Results

1. The content of aflatoxins and ochratoxin A, estimated after harvest, was low for carrot and beetroots.
2. Concentration of both mycotoxins increased significantly during storage.
3. Generally there were no significant differences in the toxins amount between organic and conventional products. However, for aflatoxins the tendencies of higher accumulation of these substances in conventional vegetables were observed.
4. More toxins were accumulated in beetroots, and for aflatoxins these differences between both kinds of vegetables were significant in all years of the study.

Method and materials

The content of mycotoxins was studies in carrots and beetroots, collected from organic and conventional farms, located in central, southern and northwestern Poland, in the years 2010 – 2012. The concentrations of total aflatoxins and ochratoxin A was studied in plant material immediately after harvest and after six months of storage at 2°C. The analyses were performed by the immunoenzymatic method ELISA using Radiascreen test of R-Biopharm AG and Microplate ReaderStat Fax 3200. Limit of detection for both mycotoxins was 0.05 $\mu g \cdot kg^{-1}$. Prior to analysis roots of carrot and beets were homogenized with methanol-water solution (for total aflatoxins) and buffer $NaHCO_3$(for ochratoxin A). Extract was filtrated through a filter paper and used for immunoenzymatic test. The data were analyzed by means of t-test with variance approximated by Cochran-Cox method.

Fig.1. The average content of total aflatoxins in carrot roots and beetroots analysed immediately after harvest.

Fig.2. The average content of total aflatoxins in carrot roots and beetroots analysed after six months of storage at 2°C.

Fig.3. The average content of ochratoxin A in carrot roots and beetroots analysed immediately after harvest.

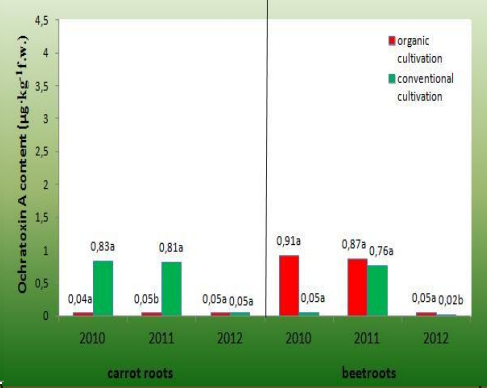


Fig.4. The average content of ochratoxin A in caroot roots and beetroots analysed after six months of storage at 2°C.

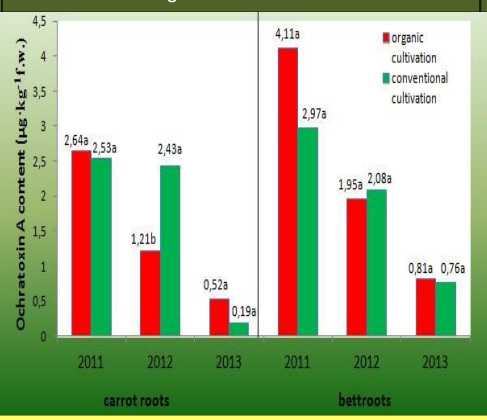
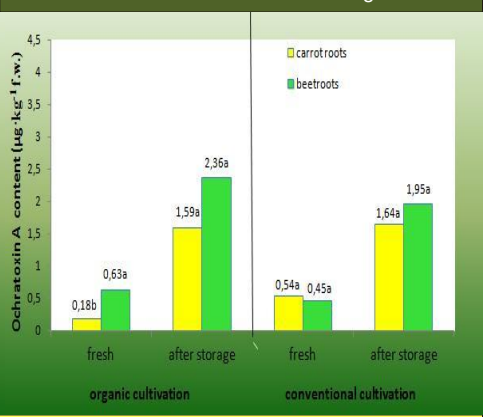


Fig.5. Content of total aflatoxins in carrot roots and beetroots analysed immediately after harvest and after six months of storage at 2°C.

Fig.6. Content of ochratoxin A in carrot roots and beetroots immediately analysed after harvest and after six months of storage at 2°C.



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