Influence of long-term storage on glycoalkaloids content in potato tubers

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Abstract
Glycoalkaloids are steroidal glycosides which occur in some cultivated crops belong to family Solanaceae. The most important crops from this family are potatoes (Solanum tuberosum). 95% of total glycoalkaloids in potatoes represent chaconin and solanin. Both of them possess toxic effect for humans. Toxic effect consists in acetylcholinesterase inhibition and damage of cell membranes. Fatal dose for adults is ranged between 3 – 6 mg/kg body weight. Legislative limit in Czech Republic for glycoalkaloids content in unpeeled potatoes tubers is 200 mg/kg fresh weight. There exist potential risk for exceeding of this limit by action of plenty factors. Lot of them are commonly known (e.g. influence of variety, mechanical damage, stage of maturity, etc.). On the other hand, some factors are not sufficiently examined (e.g. influence of cooking, illumination or long-term storage).

Aim of this study was to investigate influence of long-term storage on glycoalkaloids content in potato tubers. Solanin and chaconin were determined using HPLC-MS/MS technique. Two similar experiments were done. From October 2008 to May 2010 two cultivars of potatoes (cv. Dali and cv. Adéla) were stored. They were placed into the climabox set at 7.5 °C. Sampling was done every month. Second experiment was implemented from September 2009 to April 2010. Eight coloured cultivars of potato were examined (cvs. Valfi, Vitelotte, Blaue Elise, Highland Burgundy Red, Blaue St. Galler, Blue congo, Rote Emma and Rosalinde). They were placed into the climabox set at 5 °C. Samples were tested in the first and last month.

Firstly is important to say that in any variety and any sample date wasn’t the legislative limit 200 mg/kg f.w. exceeded during both experiments.

Concerning cv. Ditta and cv.Dali, glycoalkaloids content move around original value and at the end of experiment a moderate increase was observed (cv. Dali from 39 mg/kg f.w. to 50 mg/kg f.w.; cv. Adéla from 43 mg/kg f.w. to 52 mg/kg f.w.).

In the second experiment remarkable increase of glycoalkaloids content was observed in cultivars with higher initial content (cv. Rosalinde from 57 to 91 mg/kg f.w.) and in contrast in cultivars with lower initial content some decrease of glycoalkaloid was observed. (cv. Blaue Elise from 33 to 15 mg/kg f.w.).

This study denotes that appropriate long-term storage of healthy potato tubers doesn’t cause significant increase of toxic glycoalkaloids content. On the other hand, results indicated that cultivars with high initial content of glycoalkaloids have higher capability to synthetize further glycoalkaloids during storage and thus they are not suitable for long-term storage.

Key words: potatoes, glycoalkaloids, long-term storage, HPLC-MS/MS

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