

Cultivation and analysis of anthocyanins containing-, blue potatoes.

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Abstract Anthocyanins, as secondary plant substance in different agricultural crops such as potatoes and cereals have positive effects on health due to their antioxidant capacity. Therefore food industry, nutritional medicine and consumers have an increasing interest in these crops. The objectives of the interdisciplinary research project (AGIP) starting in march 2006 are ascertainment and assessment of the impact of different agricultural production processes and production intensities. Furthermore, the impact of different ways of food preparation concerning anthocyanin content and antioxidative capacity in selected cultivated plants will be tested. Main focus will be on potatoes due to the fact that potatoes as a staple food are consumed in large quantities. Therefore potatoes can be an important quantitative source for anthocyanins.¹

Potatoes are characterised by a great diversity of varieties. Besides yellow- and white-fleshed varieties there are also old varieties and blue-fleshed potatoes (Figure 1) containing anthocyanins. It is poorly documented how much land is under cultivation with blue-fleshed potatoes in organic farms. Experiences in cultivation of old potato varieties do hardly exist.



Figure 1: Different varieties of white-, yellow-, red-, purple- and blue-fleshed potatoes

The positive effects on health by Flavonoids (chemical main group of Anthocyanin) depend on their antioxidative capacity (activity). Antioxidants prevent the formation of highly reactive lipid peroxidation products and reduce the deleterious effects of reactive oxygen species. In vitro studies showed that the risk of cancer could be reduced in many respects (Watzl et al., 2002; Murkovic, 2002; Kähkönen, 2003; Katsube et al., 2003).

For a successful expansion of blue potato cultivation a plant breeding development of old existing varieties is required. In order to accomplish current needs as form, tuber size, tuber eye depth, flavour, condition of potato peel and culinary quality, a potato breeding company is involved in the project. Yield and anthocyanin content depend on the variety and are also correlated to cultivation location and production process. Furthermore they respond on different production intensities (manuring).

Within the interdisciplinary research project the University of Applied Sciences Osnabrück carries out field trials in cooperation with the project partners. A test comparing different locations will determine relevant aspects of blue potato cultivation (potatoes with anthocyanin content). Environmental impacts on research parameters during the growing season in the test years will be documented as well.

The date of harvest, storage and the way of food preparation has a quantifying impact on the anthocyanin content in the eatable end product. To determine the relevance of the harvest time, different dates of harvesting are planned. For a documentation of storage effects following analyses after harvesting will be executed:

- immediately after harvesting: tests at raw crops (potatoes) = survey of the primary anthocyanin concentration
- after eight weeks of storage: tests with raw potatoes and according to cooking and baking standards = survey of losses during storage (raw), survey of a reduction during cooking or baking
- after 16 weeks of storage: tests with raw potatoes and according to cooking and baking standards = survey of losses during storage (raw), survey of a reduction during cooking or baking

The impact of food preparation (cooking, steaming) on anthocyanin content is quantitatively and qualitatively analysed in cooperation with the Technical University of Braunschweig. Guidelines and recommendations for cooking or baking of blue potato tubers can be derived from the results.

To identify the consumer acceptance the aspects of flavour of the different varieties must be proofed. The blue colour is a particular problem in this context. Within the project an adequate testing procedure must be found that is able to eliminate the influence of the potato flesh colour while assessment (blind tasting).

Standardised organoleptic tests of the potato tubes have to be carried out. The accepted method of hedonic tests will be applied. Untrained consumers will test the products in regard to their subjective flavour perception what means "good" or "bad".

This affective test can give information about an overall acceptance in terms of appearance, taste, aroma, consistency and texture of the potato tubers, about consumer acceptance and therefore about the prospective demand. Test meals will be prepared at the Centre for consumer information, nutrition, sustainable food production and post harvest technology WABE of the University of Applied Sciences Osnabrück, Department of nutritional sciences and home economics.

The achievements will be discussed rapidly and continuously with the plant breeding company so they can directly influence the breeding process.

Project results will also be provided to farmers, specialist workers of nutritional medicine and as well as to consumers.

Overall the receipt and breeding of cash crops with anthocyanin content can develop the diversity of useful plants and give a valuable contribution for the biodiversity of agricultural useful plants.

References

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