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Improving the phytochemical profile and bioactivity of Chinese cabbage sprouts by interspecies transfer of metabolites

The high demand for healthy food in recent years led to an increasing need for highly bioactive plant materials. One simple method to improve the nutritional properties of plants could be the treatment of plants of known bioactive potential (acceptor) with extracts of different plant species (donors) that contain additional high bioactive compounds, so-called interspecific source-sink phytochemical transfer. The aim of the present study was to evaluate the effect of interspecific transfer of metabolites on plant phenolic and vitamin C profile to improve their gastrointestinal bioavailability, hypoglycemic potential, and antioxidant capacity as well as cytotoxicity. Additionally, it was tested whether there is an effect of phytochemical transfer on the expression of marker genes in phenolic biosynthetic pathways. Chinese cabbage (*Brassica rapa ssp. pekinensis*) sprouts were chosen as a model of plant acceptor, while the inflorescences of St John`s-wort (*Hypericum perforatum*) and chamomile (*Matricaria chamomilla*), leaves of rose (Rosa sp.) and shoots of black bryony (*Tamus communis*) were used as plant donors. Even though the chamomile extract increased the highest number of individually identified compounds in Chinese cabbage sprouts, that was not crucial for the improvement of their bioactivity. Rather, black bryony application induced more biopotential parameters in the sprouts such as significantly improved bioavailability of vitamin C, kaempferol and total phenolics both before and during gastrointestinal digestion of sprouts, increased hypoglycemic activity of sprouts, and their antioxidant capacity during digestion. For an increased cytotoxicity against MCF cells, St. John`s-wort, rose and chamomille extracts could be applied to Chinese cabbage sprouts. The results suggest that interspecific phytochemical transfer could enhance the phytochemical profile and the bioactive properties of the acceptor plant.

Keywords: antidiabetic activity, antioxidant capacity, cytotoxicity, gastrointestinal bioavailability, qRT-PCR; RP-HPLC.

Biography:

I work in Laboratory for Phytochemistry, my main scientific interest is plant plant specialized metabolism plasticity (e.g., changes in concentration of different metabolites, synthesis of new compounds, genotype and/or phenotype adjustment (ecotype and/or yield, respectively), bioactivity and bioavailability changes), and possibilities like the use of a specialized metabolites profile as an indicator of stress in the environment, boosting of specific metabolites in order to produce a value-added plant food, and screening of specialized metabolism changes for prediction models. I teach and/or hold praktika in plant anatomy, plant bioactive substances, and molecular biology of plants.