

Bioactive metabolites in crops, diets and human samples

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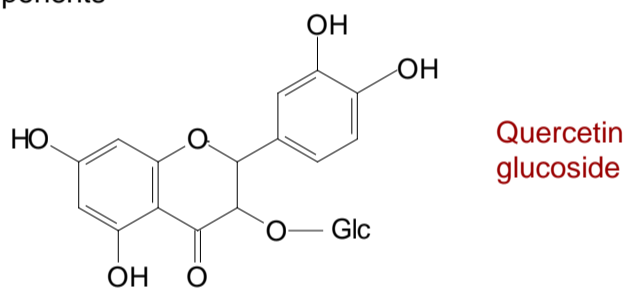
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Background

It is well-known that consumption of fruit and vegetables has health promoting effects. The content of bioactive secondary metabolites in plants contributes to this and their production is affected by the growth system.

An example of secondary bioactive metabolites are flavonoids:

- they are plant polyphenols found in several plants
- more than 4000 flavonoids are known ¹
- as a result of their antioxidant activity, the compounds are of interest to human health ¹
- they are often found as glucosides in nature, for instance, quercetin-glucoside, and the biological activity vary for the single components



The PhD-project is part of the OrgTrace project, where the content, bioavailability and health effects of trace elements and bioactive components in organic agricultural systems is investigated.

Aims of PhD-project

- to characterize bioactive secondary metabolites, such as polyphenols, in selected crops after harvest in autumn 2007 and 2008
- to investigate the influence of different growth systems on the ability of crops to synthesize bioactive metabolites
- to investigate the bioavailability of selected bioactive metabolites as part of a human intervention study by analysis of both diets and human samples

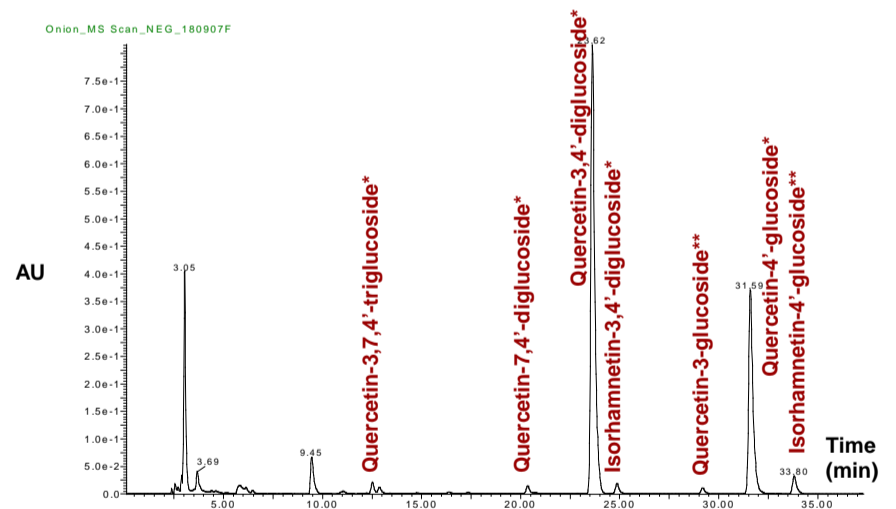
Onion – one of the test crops

- Onions contain high concentrations of flavonoids
- The major flavonoids in onions are quercetin-4'-O-glucoside and quercetin-3,4'-O-diglucoside, which together account for about 80% of the total content of flavonoids ²

Experimental approach

- Crop: Organic grown onion (*Allium cepa* var. *zittauer*)
- HPLC:
 - Solvents: A - 0.1% formic acid : methanol (90:10)
B - 100% methanol
 - Gradient:
 - Column: Phenomenex, Prodigy C₁₈, 5 µm, 4.6x250 mm
 - 10 µl injection volume, 1 ml/min
- Detection:
 - PDA detector (Waters 2996), detection at 254 nm
 - ESI-MS and MSMS (Waters Quattro LC, QqQ)

Results



* tentative identification

** identification confirmed by standard

Conclusions

- Preliminary runs confirms the presence of flavonoids in onions
- Identification needs to be confirmed with available standards. Otherwise accurate mass measurements will be performed on a QTOF-instrument and if possible combined with NMR

References:

¹ Merken and Beecher (2000). Measurements of food flavonoids by high-performance liquid chromatography: A review. **Journal of Agricultural and Food Chemistry**, 48, 578-599

² Bonaccorsi *et al.* (2005). Flavonol glucoside profile of southern Italian red onion (*Allium cepa* L.). **Journal of Agricultural and Food Chemistry**, 53, 2773-2740

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