

B019 A simple HPLC-UV procedure for the assay of ginkgolic acids in *Ginkgo biloba* extracts

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Extracts from the leaves of *Ginkgo biloba* L. belong to the most widely used phytotherapeutics. Some alkylphenols (anacardic or ginkgolic acids, cardanols and cardols) have been identified as potentially hazardous constituents in ginkgo extracts (1). Ginkgolic acids found in ginkgo leaves mainly contain C13, C15 and C17 alkenyl chains.

These compounds, besides strong allergenic properties, possess possibly mutagenic and carcinogenic activity and do not contribute to the therapeutic action of ginkgo extracts. Accordingly a requirement for minimum concentrations of these constituents has been included in the monographs of UE and US Pharmacopoeias by establishing a limit value of maximally 5 ppm.

The typical analytical procedure to quantify these constituents involves an enrichment by liquid-liquid extraction of the aqueous *G. biloba* solution with ethyl acetate or aliphatic hydrocarbons (e.g. hexane), concentration of the organic layer and analysis by reversed phase chromatography. This procedure is time consuming and lacks in reproducibility.

Aim of this study is to develop an HPLC-UV method which, without solvent extraction, allows a simple and precise determination of ginkgolic acids. The identification of the ginkgolic acids and related alcohols, and the specificity of the new method were assessed by means of HPLC-APCI-MS and HPLC-DAD studies.

References: 1. Jaggy, H. and Koch, E. (1997) Pharmazie 52: 735-738.

B020 Ontogenetic changes of cysteine sulphoxides in *Allium ursinum* L.

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Leaves of ramson (*Allium ursinum* L., Alliaceae), a wild-growing *Allium*-species of Europe and Northern Asia, are widely used in traditional medicine and as spice. According to garlic (*Allium sativum* L.), the best-known representative of the genus *Allium*, ramson contains a high amount of several cysteine sulphoxides as well as the enzyme alliinase (Figure 1). Volatile sulphur-containing compounds (being formed by the contact of alliinase and cysteine sulphoxides in disrupted-plant material) create the characteristic flavour of *Allium* species and are suggested to have various therapeutical effects. Consequently, high amounts of cysteine sulphoxides have a direct impact on the quality of ramson as a phytopharmakon and spice (1, 2).

Cysteine sulphoxides were detected in all investigated plant parts (bulbs, germs, leaves). *A. ursinum* contains methiin and alliin as the main constituents in all parts of the plant and the pattern of these compounds differs from that of garlic, which contains significantly less methiin, but higher levels of alliin. Additionally, traces of isoalliin and propiin were found. Over the vegetation period, the total content of cysteine sulphoxides in leaves decreased from 0.4 % to < 0.1 %. Significant differences were also found for the inner and outer part of the bulb. The entire bulb showed highest levels in early spring (0.4 %) also followed by a rapid decrease down to 0.1 %. Thus, the date of harvest strongly affects the quality of this phytopharmakon and its flavouring properties.

References: 1. Krest, I. et al. (2000) J. Agric. Food. Chem. 48: 3753-3760. 2. Krest I. (2000), Entwicklung und Optimierung eines Alliin-Biosensors, Dissertation Univ. Bonn, Germany.

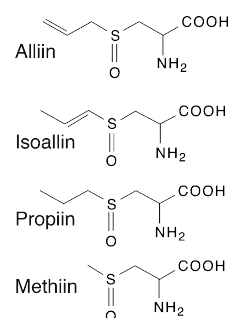


Figure 1. Typical cysteine sulphoxides of *Allium* species like methiin, alliin, isoalliin, and propiin.