

Pyrrrolizidine Alkaloids in Bee Pollen

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Pyrrrolizidine alkaloids (PAs) are produced by plants as secondary metabolites for protection against herbivores. It has been estimated, that more than 6000 plant species contain PAs, many of them contributing to the production of honey and bee pollen.

In August 2011, the Federal Institute for Risk Assessment (Bundesinstitut für Risikobewertung, BfR) in Germany recommended a maximum daily uptake of 0,007 µg/kg of PAs per kg bodyweight in order to prevent an increase of cancer risk. Thus, it is worthwhile to have a look on the PA-concentrations in commercial bee pollen samples.

In this study, more than 100 bee pollen samples were analysed. PAs were extracted by means of solid phase extraction (strong cation exchanger) and subsequent analysis using LC-MS/MS in MRM mode (multi reaction monitoring). The limit of quantitation (LOQ) was 10 µg/kg.

The results show strong variations between levels <LOQ and up to several mg/kg of PAs (average PA-concentration in raw honeys is below 0,06 mg/kg). Lycopsamine and isomers thereof as well as echimidine were the most common PAs. The reason for the strong variation of the PA-concentrations are different botanical origins of bee pollen. Some bee pollen samples contain high amounts of *Echium* bee pollen grains. As *Echium* (e.g. Viper's Bugloss, Salvation Jane, Pattersons Curse) is a well known and common PA plant, bee pollen mixtures containing *Echium* pollen are likely to contain high amounts of PAs, especially echimidine, which can be regarded as marker PA for the genus *Echium*.

Many people eat bee pollen grains on a daily basis as food supplement. Those pollen mixtures containing high numbers of bee pollen grains from PA-plants are likely to lead to an uptake of PAs, that is higher than that recommended by the German Federal Institute for Risk Assessment.

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