Chemical and morphological variations of Czech and Finnish *Acorus calamus* L. accessions in gene bank collections

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The aim of the study

Dried roots of sweet-flag (*Acorus calamus* L., Araceae) have long been used in medicinal preparations and for the flavouring of bitter liqueurs and appetizers. Due to the habitat loss of *Acorus* its populations have become rare in several European countries. The focus now is on the conservation of its genetic resources and to start its field cultivation to meet the raw material demand. The aim of this study was to analyse the chemical and morphological characters of *Acorus calamus* L. collected from the nature in Finland and to compare them to the *Acorus* accessions collected in the Czech Gene Bank.

Material and methods

The Finnish accessions have been collected during 2002 in South-West Finland at seven natural populations and one accession was obtained from Slovenia (Zalec). (Picture 1). Root cuttings were transplanted into mineral soil, field plots (pH 6.8) of Agrifood Research Finland, Mikkeli and grown for two years. (Picture 3).

The collection of Czech sweet-flags has been found in 1998 from 27 accessories originated from all country. (Picture 2). The cuttings were replanted into the growing containers to Gene Bank in Olomouc. A special basin was built to keep them in optimal wet conditions and to protect sprouting of rhizomes and mixing. (Picture 4).

Leave and rhizome morphological characters, essential oil content and composition of the dried rhizome were determined (Czech accessions during 1997-2000, Finnish accessions during 2004). (Picture 5 and 6).

Results

The average oil content of the Finnish and Slovenian accessions was 1.47 % (1.15-1.87 %) and the oil composition was quite similar. The main compounds of the oils were solavetivon, x = 11.07 % (7.8-15.6 %) and β-asarone, x = 10.08 % (9.0-11.5 %). The average oil content of the Czech accessions was 1.91 % (1.20-2.92 %). It is slightly higher than in Finland, but anyway 14 from 24 analysed samples did not execute the norm defined for quality of *Radix calami* by Czech Pharmaceutical Codex (minimum 2 % of essential oil). The main compounds of the essential oils were β- and γ-asarones. The average content of γ-asarone was 18.65 % (12.52-25-35 %) and that of the β-asarone was 16.11 % (11.34-21.30 %). The content of the β-asarone in sweet-flag drug did not exceed the maximal recommended value 0.5 % of dry matter content.

Conclusion

The Finnish, Slovenian and Czech origin sweet-flags in both Finnish and Czech collections seemed to be phenotypically and chemically very similar to each other. They all represent the European triploid type of *Acorus calamus* var. *calamus*. The average essential oil content (1.47 % in Finland and 1.91 % in the Czech Republic) is not sufficient according to the Czech norm for *Radix calami* quality, but the content of carcinogen β-asarone did not exceeded secure limit 0.5 % of dry drug mass.