Development of Biotechnological Protocols in Medicinal Plants Research – Contribution for safeguarding and standardization of raw material for Phytotherapy using Hypericum species indigenous to the Balkan region

Wolfram E1, Peter S1, Könye R1, Meier B1, Danova K2
1 Zurich University of Applied Sciences, Life Sciences and Facility Management, Institute of Biotechnology, Wädenswil 8820, Switzerland
2 Institute of Organic Chemistry Centre of Phytochemistry, Bulgarian Academy of Science, Sofia, Bulgaria

Introduction and Aim of the Research Activities

Threats for medicinal plant species are unmonitored trade, over-exploitation, destructive harvesting techniques, as well as habitat loss and habitat changes. As a result, diminution of population sizes, genetic diversity and eventually the extinction of the species could occur.

PhyBioBalk project - a Bulgarian-Swiss Joint Research Project - strives for

- Biotechnological Protocols for in vitro Cultivation, Standardization and Conservation of valuable medicinal plants indigenous to the Balkan region
- Exploring the practical applicability of biotechnological cultivation techniques for standardized production of medicinal plant raw material
- Hypotheses to be tested: By controlling culture conditions in vitro, it is possible to target the production of plant biomass with desired properties.

Preliminary Results

HPTLC fingerprint comparison of Hypericum sp. from different cultivations

H. richeri in situ and in vitro

H. rumeliacum in vitro

H. calycinum in vitro

H. perforatum in vitro

Comparison of Hypericine und Pseudohypericine levels in conventional and in vitro samples

Discussion and Preliminary Conclusions

- In in vitro samples of all tested Hypericum species, Flavonoids rather lower, whereas Hypericines and Pseudohypericines levels comparable up to slightly superior to commercial H. perforatum extracts except for H. calycinum, where almost no Hypericine and Pseudohypericine can be detected
- The development of biotechnological protocols provides innovative tools for medicinal plant research: enabling robustness studies against plant diseases and alternative and controllable production technique for target secondary metabolites.
- Standardization and Safeguarding: Conventional cultivation H. perforatum might show high variability of monographed Hypericine levels due to environmental factors. Anthracnose threatens yield. Micropropagation with subsequent field cultivation or in vitro production of native material could offer reliable yield with lower content variability
- Current Regulatory Limitations: Non-monographed Hypericum species are not an alternative source for pharmaceutical applications. Pure in vitro cultivation not yet accepted as production technique for medicinal plant biomass.
- Sustainability: Aspect of the conservation of biodiversity and basic research for non-foreseeable future applications guides the scientific activities

Materials and Methods

B. Meier, W. Wolfram, P. Sutter, E. Wolfram, K. Danova (2016) Phytotherapy Research Group, Wädenswil, Switzerland

Acknowledgements

We thank Swiss National Fond (SNF) for funding of the Bulgarian Swiss Research Project Grant No. I2EBZ2.142989 and DO2.1153 and the ZHAW Wädenswil for financial support.

References


Contacts

Dr. Evelyn Wolfram  ewelyn.wolfram@zhaw.ch
Zurich University of Applied Sciences, Institute of Biotechnology

Dr. Kalina Danova  k_danova@abv.bg
Bulgarian Academy of Sciences, Institute of Organic Chemistry