SLOVAK ACADEMY OF SCIENCES
INSTITUTE OF BOTANY
DÚBRAVSKÁ CESTA 14
845 23 BRATISLAVA
SLOVAK REPUBLIC

TEL: ++421-2-59426143 FAX: ++421-2-5477 1948 E-MAIL: ANNA.GUTTOVA@SAVBA.SK

Bratislava, 18 October 2010

To whom it may concern

Review of the PhD thesis

Lichen uses – potentials of the European Guideline

by David Svoboda, Charles University in Prague, Faculty of Science, Department of Botany

Introduction

Wide range of "lichen uses" topic has been a source of great number of questions clarified by different projects or PhD thesis, starting with biomonitoring approaches to implications of lichen abundance for boreal caribou populations (cf. Dunford et al. 2006). During recent decades, the growing concern over atmospheric depositions has led to a steady increase in the use of living organisms to estimate levels of environmental contamination (bioaccumulation) and/or its biological effects (bioindication). The direct measurements of the element deposition into ecosystems is a very difficult task, due to considerable spatial and temporal variations in trace element concentrations and physicochemical characteristics. The high cost of instrumental monitoring limits the establishment of wide and / or high density monitoring networks. Biomonitoring should be able to produce rapid, reliable and inexpensive data, which cannot be produced by any other approach. Thus, the appreciation of biomonitoring should improve among environmental managers and planners in governmental agencies and industry (Bargagli 1998).

Biomonitoring studies have been well established in Czech Republic mostly thanks to the work of Jiří Liška. As this "floor" is open, evolving and inviting, there is no wonder that further contributions are being done to it frequently. David Svoboda decided to use this floor and contribute with his research in altering epiphytic lichen vegetation due to the changing air quality in Central Europe through the application of procedures in so called LDV method.

Assessment

- Presentation and clarity

The outputs of the studies are presented in a standard PhD thesis format, comprising 5 Chapters and Conclusions, Curriculum vitae and the list of selected publications. The text is concise, telling the story clearly, the style is accurate. The reference list is accurate, showing that a student has knowledge of original sources, adequate knowledge of the field and understands both theoretical and methodological issues.

- Integration and coherence

There is a logical and rational link between the chapters/sections of the thesis. However, the reading is not a priori challenging. The ideas are interlinked in a kind of "staccato".

- Contribution to knowledge

The thesis is built upon 3 published articles (2 WOS, fully refereed journals, 1 other type of journal) and 2 submitted manuscripts.

- Originality and creativity

The work is original, performed by the candidate himself, or with his collaborators. David Svoboda increased the skills on the topic of bioindication based on diversity of epiphytic lichens (LDV index) during his stay in Grenoble.

- Review of relevant literature

The review of literature (chapter 3) introduces the main directions of the work which is presented in this PhD. thesis. It is concise, clear. Having in mind the headline of the thesis – "mapping lichen diversity" it would have been valuable to discuss/confront deeper the LDV method with approach used in Forest Biota project which applied the ICP-Forest method (S. Stofer, V. Catalayud, M. Ferretti, R. Fischer, P. Giordani, C. Keller, N. Stapper, C. Scheidegger 2003: *Epiphytic Lichen Monitoring within the EU/ICP Forests Biodiversity Test-Phase on Level II plots*, http://www.forestbiota.org/docs/bbb-lichens_june05.pdf; S. Stofer 2006: *Working Report ForestBIOTA - Epiphytic Lichen Monitoring*, http://www.forestbiota.org/docs/report_lichens_20060503.pdf; http://www.forestbiota.org/). Other similar works dealing with the topic of lichen diversity and forests, like Poličnik et al. 2007: *Monitoring air quality with lichens: A comparison between mapping in forest sites and in open areas*, J. Env. Pol., would have contributed to more detailed confrontation of the results coming out of the thesis with the outputs of similar works already done. This would have highlight the relevance of the results much more.

- Statement of the research problem

Five objectives of the thesis are given in the Chapter 3. Research problems are clearly stated and the need why to address them is worthwhile was justified.

- Methods of enquiry adopted

The methods are detailed in the articles and manuscripts, the separate paragraph is not included in the introductory chapters. Lichen diversity data sampling (relevés) were gathered through LDV approach, alternatively the Hawksworth & Rose approach, and further elaborated with relevant statistical instruments.

Summary

The results of the thesis were either already published in peer-reviewed WOS or other journals (thus underwent the review procedure) or are in a reviewing process. Below I give following remarks to the text or some disturbing formulations alternatively:

- Basic information about LDV is slightly repetitigve in the chapters 2.2, 3.1 and 3.1
- Article II – Results: other, more specific and updated reference material, for comments on rareness of the species in the studied area, specifically Slovakia, could have been considered instead of Pišút 1999, for example Pišút et al. 2001 – Red list of lichens. Also, the species list by Pišút (1997, Application of some epiphytic lichens for environmental valorisation of mountain forests in Slovakia, Biologia 52: 23-26)
- Article II – Methods: the reference for the data on mean annual precipitation is Veselský 1958. Is this the only relevant source these days? Does it also cover other two countries where the sampling was done? Does the www.chmi.cz cover the data for SO_2, NO_x and PM up to 10 for all the studied territory?
- Article IV - p. 5, Tab. 1: the table gives numbers for Abundance of the species during two sampling campaigns. If the data are based on LDV values, can we speak about abundance here?
- Article V – p. 15: Undobtedly, the major reason of missing "Lobarion lichens" in the sampled oak woods in Slovakia are air pollution in the 20th century and forest fragmentation. The faithful species *Lobaria pulmonaria* used to be recorded on oaks in lower altitudes as well, e.g. in the Východoslovenská rovina plain (Szatala, 150 m a.s.l., 1911), Kremnické vrchy Mts (650 – 670

m a.s.l., 1926), Štiavnické vrchy Mts (Kmeť, the end of 19th century), or another faithful species Lobarina scrobiculata - Kremnické vrchy Mts (Suza 1937, 650 m a.s.l.) (Pišút I. 2005: Acta Rer. Natur. Mus. Nat. Slov. LI: 15-29). The mentioned Lobarion associations in Muránska planina National Park could hardly be characterized as well developed, they represent the remnants of these associations.

- Article V – p. 15, the list of recorded species: what is the general approach to including epibryophitic species (*Agonimia tristicula*) into analyses, which in fact increase the local biodiversity, but they are not proper epiphytes (sensu-stricto), or this species belongs to the 11 "incidental", and these were not included into analyses?
- Article V – p. 5 Methods: regarding the variables – namely LDVs, did you explore the possibility to use 5 classes of the scale (proposed in the Article I) instead of 7, what impact this could have on the definition of groups/clusters in the subsequent data analyses?
- Haven´t you considered to include into the analyses in Art. II and V the existing relevés gathered from 29 sample units from the period 2004 – 2006 in Slovakia, or some selection of them, to enrich the base of data for this territory?

Conclusion

The PhD thesis by David Svoboda are of adequate standard and meet the criteria which are set. After successful defence of the PhD thesis I recommend that David is awareded the PhD degree.

Mgr. Anna Guttová, PhD.
senior researcher, Department of non-vascular plants