

Reviewer's report of the Ph.D. thesis entitled:

**The role of arbuscular mycorrhizal symbiosis in plant performance under the specific edaphic conditions of serpentine soils.**

**(by Pavla Doubková, Charles University in Prague, Faculty of Science, Department of Experimental Plant Biology)**

The reviewed thesis is focused on rather narrow topic of the plant ecology. However, the studies in this topic may provide a knowledge of more general importance as plant communities growing in serpentine soils may serve as an example of plants living under nutritional stress and adaptation of biota to the stress.

The thesis is composed of introductory summarizing section and six scientific reports, five of them being already released in reputed journals and one is probable at the stage of submission. The defendant stands as first author on five works and also as corresponding author on four works, which indicates her deep involvement in the reported research. Even though each of the articles is valuable in standing alone form, all the six works together constitute a package of results with strong and logically consistent structure. This indicates that the defendant is working goalseekingly under the guidance of competent persons.

The section „General introduction“ (pg. 11-16) is relatively short but sufficient. Further general information is contained in literature overviews of the articles.

The choice of the model plant - *Knautia arvensis* - is well justified (pg. 19) mainly by the existence of this species on serpentine as well as non-serpentine localities in two ploidy forms: diploid and tetraploid. This provides the opportunity for field observations. At the same time, the known diverse localities can serve as sources of biological material for controlled greenhouse experiments. It is further important that *K. arvensis* is a mycorrhizal plant living in arbuscular mycorrhizal symbiosis known to modulate the plant tolerance to various types of stress.

The working hypotheses, which are defined on pg. 18, were induced by the aims of the thesis (pg. 17). The aims are realistic and are well suited to the context of the recent knowledge of the topic.

Methodology used in experiments and observations is diverse, includes field observations, greenhouse experimentation as well as molecular methods of microbial community analysis and are appropriate for the given type of the research. A general view of methodology used in different experiments/publications is given in section "Overview of the conducted surveys and experiments". This section strongly enhances the reading of the thesis and is very useful.

In one experiment presented in the thesis (MS4), arbuscular mycorrhizal fungi colonizing *K. arvensis* were isolated from natural serpentine and non-serpentine localities but the isolation was successful only in the case of serpentine site originating isolates. Isolation from selected non-serpentine sites failed (pg. 20). I am very interested in possible reason for this result. How many times the isolation has been attempted? Is it possible to attribute this just to resistance of unstressed *K. arvensis* plants under a particular cultivation regime to colonization by arbuscular mycorrhizal fungi? In this context, which is the opinion of the defendant about good colonization of non serpentine fungal isolates in non-serpentine soils (pg. 62)?

In MS5, the tolerance of mycorrhizal and non-mycorrhizal plants to available Ni has been studied, with the result indicating a decrease of the tolerance in the presence of mycorrhizal symbiosis, possibly due to the accumulation of Ni in mycorrhizal roots. However, this result was obtained in semi-hydroponically cultivated plants where the metal availability may strongly differ from that in natural soil. Is it possible to compare the availability (concentrations of the dissolved ionic form) of Ni in the field and in the semihydroponic system?

As the first five articles have been already published in scientific journals, they had to pass the stringent process of review and possible imperfections have been fixed. I thus focus my attention more to the last article which is obviously still not released. It is unclear why the term „molecular taxonomical unit (MOTU)“ is used instead of the traditionally accepted term „operational taxonomic unit“ (pg. 133). What is the difference of both terms? Further, I do not understand how and why the „soil characteristics, climate, life stage of plants, spatial distances“ can be taken as „processes“ (pg. 130 and other locations). In my opinion these are subjects rather than processes. What is the meaning of the FigS2 (pg. 153) and why it is important (pg. 133)? I suggest to simplify the text of the article (though the language of the article seems to be very good) to increase its readability.

Taking into account the facts mentioned above as well as the opinion attained by the reading the content of the thesis, I state that the reviewed work meets the criteria established for PhD thesis. P. Doubková proved to be able to collect and evaluate experimental data as well as to interpret them in the context of existing scientific knowledge. I thus propose to award her a PhD degree.

In Prague, Nov 23, 2014

**Reviewer:**

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