



Review of USB FFPW PhD thesis

First name(s), surname, titles of the PhD student: Ewumi Azeez Olatunji Folorunzo, M.Sc.	First name(s), surname, titles of supervisor: Jan Mráz, doc. Ing. Ph.D.
Title of PhD thesis: Integrated pest and disease management in aquaponics	

REVIEWER:

Surname: Klouček	Institution: Czech University of Life Sciences Prague, Faculty of Agrobiolgy, Food and Natural Resources 165 21 Praha 6 - Suchbøl
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Please describe your professional relationship to the PhD student:	Please describe your field of expertise:

QUESTIONNAIRE

Originality, scientific importance, perspectives and impacts of results presented in the PhD thesis for basic and/or applied research

Evaluate competitiveness of the PhD thesis in the international context and compare its level with the current state of the art in the field (**extent ¼ – ½ page**):

It is evident that new technologies will play an important role in the near future, even in agriculture. Aquaponics builds on the natural paradigm – connecting fish and plant production in a circulatory manner. However, this technology is not yet mature for massive production. One of the most important points that must be resolved is how to keep all the important organisms in good health status. This thesis is focused on plant protection in aquaponics, but it takes into account also fish and microorganisms, which is the only correct and sustainable approach. By this extensive intro I just want to say, that the student picked up a very original and important topic. It seems to be mainly on the applied side of the science, but there is still a lot of space for fundamental research, which was also partly addressed in this thesis, such as studying the fate of the applied agents.



Elaboration of the PhD thesis, objectives of the work and deliverables

Evaluate the overall level of elaboration of the PhD thesis (structuring of the main text, comprehensibility, logicity of the chapters and their ordering) and the originality of the selected approaches to solve the objectives; evaluate publications and whether the results described correspond to objectives of the PhD thesis (**extent ¼ – ½ page**):

The thesis is composed of a collection of three already published and one submitted manuscript, with a general introduction and general discussion and conclusions. The first manuscript comprehensively reviewed the possibility of integrated pest and disease management (IPDM) in aquaponics. The other three manuscripts are experimental, investigating the effectivity of entomopathogenic and mycoparasitic fungi, synthetic and botanical pesticides, as well as their possible side effects on fish and nitrifying bacteria. The general introduction quite briefly covers the most important aspects of aquaponic technology, with special emphasis on plant protection. I must note that some parts could be more detailed or more specific, for example, in 1.2.2.1. Regarding pest damages, I would expect more data on economic losses in greenhouse production. On the other hand, the text goes straightly forward. The objectives are well defined and cover the whole chain from assessment of IPDM to investigation of specific methods of pest and disease control in aquaponics. General Discussion and Conclusions are well written and structured, with relevant references.

OVERALL COMMENTARY ON THE PhD THESIS

Please write in the box specific comments concerning the PhD thesis in extent of 1-2 pages:

Overall, the thesis is consistent, the four manuscripts hold together and create a good background for the general parts. The student share is more than 50% in the first three of them and 15 % in the last one.

The text of the general parts could be more precise, mainly in the specific terms and Latin names. E.g. in chapter 1.2.2 Plant pests, there is stated that mites belong to insects, which is not true. In the same chapter and in some others (e.g. 6.6 Conclusions), the Latin or the English names of the organisms are not properly written. In scientific text, it is always better to write Latin names, at least in the first appearance. Sometimes there are mistakes in using italics, e.g. in 6.1.1. in the last sentence on the page. Also, page numbers are missing in the general parts. On the other hand, the text is comprehensive, with just a few typos. In the figure captions, it would be better to provide authors or references, even if they come from the publications in the thesis.

My comments and objections above are only of minor importance. The topic and objectives of the thesis are quite ambitious, because the student had to master several fields of study. Aquaponics itself is a combination of aquaculture, microbiology, and plant production. The experiments obviously also involved plant protection, analytical chemistry and fish physiology.



Even though the student probably didn't perform all the experimental parts himself, he has to have advanced knowledge in all these fields. I think that all of the objectives were met at least partially, and I recommend the thesis for the defence.

Besides that, I have several questions.

In chapter 6.1, some filtration techniques are discussed to prevent the attack of pathogens. Do you think that such techniques could have some adverse effects on the nutrient's availability?

There are some hypotheses that the aquaponic solution itself could increase the resiliency of the plants. What could be the rationale for that? Did you observe such effects?

You found out and recommended some possibilities for plant protection to be used in aquaponics, such as eugenol. You prepared the formulation by emulsification with tween 20. Do you think there could be other methods for preparation of products based on essential oils?

FINAL RECOMMENDATION

- ☒ **PhD thesis can be recommended for defence**
- ☐ **PhD thesis can be recommended for defence with reservations**
- ☐ **PhD thesis cannot be recommended for defence**

3. 7. 2023, Praha

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Date and place

Pavel Klouček

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Name and signature