Oponentský posudek bakalářské práce

Autor:	Pavla Beáta Trhlínová
Název práce:	The role of salicylic acid on stomata development, amount of anthocyanins and CO_2 assimilation in plant *Arabidopsis thaliana*
Vedoucí práce:	Ing. Martin Janda, Ph.D.
Oponent práce:	MSc. Tetiana Kalachova, Ph.D.

The bachelor thesis of Pavla Beáta Trhlínová is aiming to dissect the mechanisms of plant growth inhibition connected to the hugh level of the phytohormone salicylic acid (SA). To avoid the bias of exogenic treatment author uses a comparative approach, based on the collection of previously characterized Arabidopsis thaliana mutants with altered basal content of SA. A selected subset of genotypes with high SA, low SA, or wild-type (WT) level of SA have been cultivated in several setups (in soil, in hydroponics, on Petri plates on solid medium), and the growth phenotypes have been precisely characterized. Next, author compares the photosynthetic efficiency, leaf temperature, and stomatal functioning of the mutants and connects it with the endogenous SA content. A set of novel and interesting conclusions is presented, supporting the hypothesis that high SA might inhibit photosynthesis by restricting gas Exchange because of the closed stomata. A rather separate block of work is dedicated to the study of inducible antocyanin production.

Overall, it is a solid work, logic and carefully written. The literature review is broad and well structured. Experiments are well described, with enough details to be reproduced. Despite some minor errors and unclarity, the text reads well and the message is easy to follow.

I have some minor points:

- In the literature review, an extensive part is dedicated to the role of SA in immunity, however the whole experimental part concerns growth and metabolic aspects. The link of SA with plant defences, even though well described, does not seem crucial for the work.

- 2.1.1.1. Author claims that „abiotic stress is the condition of limited quantity of the nutritional compounds for growth and development“. This is a rather limited explanation, especially as the effect of temperature on photosynthesis is discussed in the next paragraph.

- 2.3.1. The biosynthetic pathways of SA and their balance (PAL vs ICS as 10% and 90%) – is it a typical scenario for all plants, or there are different possibilities (i.e. in monocots, coniferous plants, mosses?)

- 4.1.4. To my opinion, the part of materiál freezing and soring belongs more to the extraction section, but not to the chemical treatment.

- 4.1.12. How many biological repeats were performed? If not stated here, this information must be given in the results section.

- 4.1.9. The approximation of leaf surface as two distinct values as either 1.5 or 3 cm^2 seems not very precise, given the differences between studied mutants. I suggest an average leaf surface to be estimated for each genotype (for example, by scanning and area measuring by ImageJ from ca. 10 leaves).

- 4.2.2. An increase of anthocyanins is discussed, but no statistical comparison is made. This is to be corrected.

- 4.2.3.2. Similar comment – on top to the presented graphs in time, a comparison must be made, for example by making an average of area under graph for each of the claimed 4 individual plant values.

- Fig. 20 panels A and B present the same data and seem redundant; however, I think it is acceptable to emphasize the point. In panel B, it is not clear what mean the asterisks (differences of what from what?)

General questions to the author:

1) You describe a lot of „high“, „low“, or „WT-like“ concentration of SA in planta. However, no actual concentrations of SA are been measured in the work. From the literature, what is the concentration range you would expect? How will it change in due corse of plant growth (i.e. between seedlings, soil-grown 4–5-weeks old plants, and 9-week old plants?
   What is the general SA content in Arabidopsis comparing to other plants you mention in the review (Hordeum, Camelina, Oryza)?

2) What is, to your opinion, the physiological sense of stomatal closure durng pathogen infection? what is the benefit/cost of it for plant and bacteria?

3) How SA can increase the leaf temperature? What is the known mechanism for it (in thermogenic and non-thermogenic plants?)

4) What is the physiological meaning of different number of stomata on abaxial abd adaxial leaf sides?

To conclude, I find the work well conducted, and presented aims being fulfilled. I think the author deserves a bachelor degree and I recommend an A mark (“výborně”).

In Prague, 19.05.2022

MSc. Tetiana Kalachova, PhD

Laboratory of Pathological Plant Physiology
Institute of Experimental Botany of the Czech Academy of Sciences
Rozvojova 313
Prague 6, Lysolaje
16502
kalachova@ueb.cas.cz
+420776639796