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Regulation of sulfate metabolism in C4 plants

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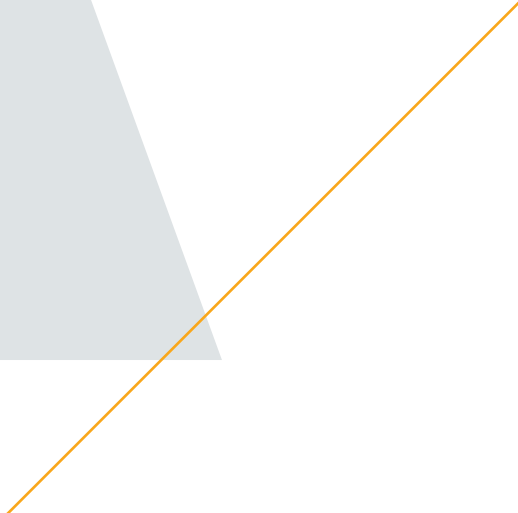
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Acknowledgments



Acknowledgments

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Firstly, my principal supervisor Luit De Kok. Already in my bachelor, his lectures on the mineral nutrition of plants confirmed that plants are fascinating organisms. Luit subsequently stimulated me to develop myself by teaching critical thinking skills and traditional plant physiology. Additionally, his (almost literally) always availability and enthusiasm were highly motivating and fueled my passion for plants. I was particularly happy with Luit's guidance and support in the last two years of my PhD, which were heavily affected by the Corona crisis and an institutional reorganization. Luit's lessons will strongly benefit me for the rest of my career and therefore having had Luit as principal supervisor was a great privilege.

Then Casper van der Kooi, my second supervisor. With his extremely bright mind, he taught me how to structure my research questions, data and writings. Casper and I also studied the impact of nutrient deprivation on floral traits and we emphasized the relevance of plant sulfur research in the Dutch media. This was all great fun and hence I am thankful that Casper engaged me in so many things.

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During my PhD, I collaborated with other researchers. I give a very big thank you to Stan(islav) Kopriva from the University of Cologne, Germany. I contacted Stan during the writing of my PhD proposal and ever since then he was always enthusiastic, supportive and optimistic. His attitude has highly motivated me and it further fueled my passion for plant biology. Thus, Stan became a really important person for my PhD progress. I also acknowledge Stan for the joint experiments and for hosting me in his lab during several lab trainings. A further thanks to all former and current members of Stan’s lab for the very welcoming atmosphere and friendships. I mention Anna Koprivova and “the C₄ researchers” Ivan Zenzen, Timothy Jobe, Parisa Rahimzadeh, Daniela Ristova, and Eme-ly Silz.

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Besides international conferences, I attended several meetings of the Dutch inter-university organization Experimental Plant Sciences (EPS). EPS was important for my PhD for two reasons. Firstly, as a master student, I joined an EPS-organized program at the Wageningen University, in which students were acquainted with botanical research in The Netherlands and wrote their own PhD proposal. The proposal that I wrote received funding from the Netherlands Organization for Scientific Research (NWO). Apart from the people of NWO, I thank the EPS office for organizing this program, particularly Ingrid Vleghels and Ton Bisseling. Secondly, during my PhD, I membered the PhD council of EPS. Thanks to all PhD council members, in particular Vera Veltkamp and Tieme Helderma (respectively chair and secretary during a significant part of my membership), for the pleasant atmosphere.

I have always felt a strong passion for making topics understandable to everybody. Therefore, I was involved in science outreach. It was a great honor to be invited for the Science Battles of Suzanne Streefland and René Broeders. Science Battles were theatre shows in which PhD students discuss their research as well as the actuality at places throughout the Netherlands. I always looked much forward to new Battles. Apart from this, I enjoyed the supervision of students. I thank Chiel Jan Riezebos, Mark Veen, Jeffrey Mulder, Thomas Polman, Sophie Postma, Lianne Hofker, Vidisha Bansal, and the students of the Plant Ecophysiology course for their contributions to my PhD and for all the fun that we generated in the greenhouse and lab.

I now continue in Dutch. Ik ga nu verder in het Nederlands. In het begin van mijn PhD was ik actief bij de plantenwerkgroep van het Instituut voor Natuureducatie in de gemeente Westerkwartier. Ik dank de leden voor de veldbezoeken en de bijzondere reis naar Oost-Polen (ik noem Marijke Akerboom en Rikus

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Zo, dit was dan mijn PhD avontuur! This was my PhD adventure!



Noorderhoogebrug, januari 2022

ABOUT THE AUTHOR

Ties Ausma was born on July 20, 1994, in Oldekerk, The Netherlands. After he obtained his Gymnasium high school diploma from RSG De Borgen in Leek, he started his bachelor Biology at the University of Groningen with the major Ecology and Evolution. Ties finished his bachelor with honors (*cum laude*) and subsequently continued with the master Ecology and Evolution. In his master, he focused on Plant Biology and he performed research projects at the Laboratories of Plant Physiology and Microbial



Ecology. In the final phase of his master, Ties enrolled in the ‘Experimental Plant Sciences (EPS) MSc talent program’, where he wrote a research proposal on uncovering the regulation of sulfate metabolism in C_4 plants. This proposal was awarded with a personal PhD grant from the Netherlands Organization for Scientific Research. Ties received his master diploma with honors (*cum laude*) and commenced his PhD project at the Laboratory of Plant Physiology, under the supervision of Dr. Luit J. De Kok, Dr. mult. Casper J. van der Kooi, and Prof. J. Theo M. Elzenga. During his project, he collaborated with Prof. Stanislav Kopriva (University of Cologne, Germany) and Prof. Maria Müller (University of Graz, Austria). He also attended international conferences and was involved in student supervision and the PhD council of EPS. Ties was furthermore actively engaged in science outreach, for he emphasized the importance of plant sulfur research in Dutch theaters during Science Battles and was featured in the media, including the Dutch science show Atlas. This dissertation results from his PhD research.

List of publications

1. **Ausma T**, Bansal V, Kraaij M, Verloop ACM, Gasperl A, Müller M, Kopriva S, De Kok LJ & van der Kooi CJ. 2021. Floral displays suffer from sulphur deprivation. *Environ. Exp. Bot.* 192: 104656.
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5. Zuidersma EI, **Ausma T**, Stuiver CEE, Prajapati DH, Hawkesford MJ & De Kok LJ. 2020. Molybdate toxicity in Chinese cabbage is not the direct consequence of changes in sulfur metabolism. *Plant Biol.* 22: 331-336.
6. **Ausma T** & De Kok LJ. 2019. Atmospheric H₂S: impact on plant functioning. *Front. Plant Sci.* 10: 743.
7. **Ausma T**, Parmar S, Hawkesford MJ & De Kok LJ. 2017. Impact of atmospheric H₂S, salinity and anoxia on sulfur metabolism in *Zea mays*. In: *Sulfur metabolism in higher plants: fundamental, environmental and agricultural aspects* (LJ De Kok, SH Haneklaus, MJ Hawkesford & E Schnug, Eds.). Springer, Dordrecht, pp. 93-101.
8. **Ausma T**, Kebert M, Stefels J & De Kok LJ. 2017. DMSP: Occurrence in plants and response to salinity in *Zea mays*. In: *Sulfur metabolism in higher plants: fundamental, environmental and agricultural aspects* (LJ De Kok, SH Haneklaus, MJ Hawkesford & E Schnug, Eds.). Springer, Dordrecht, pp. 87-91.