Impact of sulfur nutrition and H_2S exposure on expression and activity of Group 1 sulfate transporters in developing *Brassica pekinensis* seedlings

Dharmendra H. Prajapati, Tahereh Aghajanzadeh and Luit J. De Kok
Laboratory of Plant Physiology, Groningen Institute for Evolutionary Life Sciences University of Groningen, P.O. Box 11103, 9700 CC Groningen, The Netherlands (E-mail: d.h.prajapati@rug.nl)

Sulfur is an essential nutrient for plants and is taken up as sulfate by the root. The uptake of sulfate by the root is under strict metabolic control and is presumably driven by the plant's sulfur demand for growth. In addition to sulfate taken up by the root plants are able to utilize foliarly absorbed H_2S as sulfur source for growth, resulting in a decreased sink capacity of the shoot for sulfur supplied by the root. Distinct sulfate transporters are involved in the uptake and distribution of sulfate in plants. The Group 1 sulfate transporters are responsible for the primary uptake of sulfate by the root. At an ample sulfate supply, Sultr1;2 appears to be responsible for the primary uptake of sulfate by roots of Brassicaceae, but upon sulfate deprivation also Sultr1;1 is expressed. The interaction between atmospheric H_2S nutrition and pedospheric sulfate nutrition and the sulfate deprivation on the expression and activity of the sulfate transporters Sultr1;1 and Sultr1;2 was studied developing *Brassica pekinensis* seedlings.

After germination, there was a gradual increase in the level of expression of Sultr1;2 in sulfate-sufficient roots, whereas expression of Sultr1;1 was hardly detectable (determined by qRT-PCR). Upon sulfate-deprivation there was a rapid and a substantial increase in expression of Sultr1;2 within one day, whereas the expression of Sulftr1;1 started to increase only after 2 days of deprivation. The increase in expression of the Group 1 transporters in sulfate-deprived developing seedling was accompanied by a substantial increase in the sulfate uptake capacity (up to 6-fold). Exposure of seedlings to atmospheric H_2S resulted in a concentration dependent decrease in the sulfate uptake capacity of both sulfate-sufficient and sulfate-deprived roots. However, H_2S exposure hardly affected the expression of both Sultr1;1 and Sultr1;2. The latter showed the absence of direct relation between the expression and the activity of the Group 1 sulfate transporters in roots of developing *B. pekinensis* seedlings. Moreover, there was no direct relation between the sulfate and water-soluble non-protein thiols content and the activity of the sulfate transporters in the root.