Chapter 5

Salt Compartmentation and Antioxidant Defense in Roots and Leaves of Two Non-Salt Secretor Mangroves under Salt Stress

Niya Li, Xiaoyang Zhou, Ruigang Wang, Jinke Li, Cunfu Lu and Shaoliang Chen

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/intechopen.75583

Abstract

The effects of increasing NaCl (100–400 mM) on cellular salt distribution, antioxidant enzymes, and the relevance to reactive oxygen species (ROS) homeostasis were investigated in 1-year-old seedlings of two non-salt secretor mangroves, *Kandelia obovata* and *Bruguiera gymnorhiza*. *K. obovata* accumulated less Na^+ and Cl^- in root cells and leaf compartments under 400 mM NaCl compared to *B. gymnorhiza*. However, *B. gymnorhiza* leaves are notable for preferential accumulation of salt ions in epidermal vacuoles relative to mesophyll vacuoles. Both mangroves upregulated antioxidant enzymes in ASC-GSH cycle to scavenge the salt-elicited ROS in roots and leaves but with different patterns. *K. obovata* rapidly initiated antioxidant defense to reduce ROS at an early stage of salt stress, whereas *B. gymnorhiza* maintained a high capacity to detoxify ROS at high saline. Collectively, our results suggest that salinized plants of the two mangroves maintained ROS homeostasis through (i) ROS scavenging by antioxidant enzymes and (ii) limiting ROS production by protective salt compartmentation. In the latter case, an efficient salt exclusion is favorable for *K. obovata* to reduce the formation of ROS in roots and leaves, while the effective vacuolar salt compartmentation benefited *B. gymnorhiza* leaves to avoid excessive ROS production in a longer term of increasing salinity.

Keywords: *Bruguiera gymnorhiza*, *Kandelia obovata*, reactive oxygen species, antioxidant enzymes, X-ray microanalysis