Abstract

Sorbitol is a linear sugar alcohol which is, together with sucrose, the primary photosynthetic product in the Plantaginaceae family. Sorbitol and sucrose are used for long-distance transport of photosynthetically fixed carbon *via* phloem. Many plant species accumulate sugar alcohols during drought or salt stresses, and it leads to higher tolerance to these stress conditions. The aim of this diploma thesis is to describe selected metabolic and structure differences with a focus on the sorbitol and sucrose balance, in two *Plantago* species – glycophytic *Plantago lanceolata* and halophytic *Plantago maritima*, which differ in life strategies. The plants were cultivated hydroponically in Araponics boxes. Previous results of our team show, that sorbitol accumulates in *Plantago* leaves up to ten-times higher concentrations compared with sucrose. This difference is deepened when the plants are exposed to salt stress. Sorbitol to sucrose ratios vary between vascular tissue and phloem sap. We assume that increased salt tolerance of *P. maritima* is based on the different distribution of assimilates through the plant, and by their partitioning between metabolic, storage and transport pools in mature leaf, which also manifests under non-stress conditions. In both genotypes, I compared growth rates under standard conditions, determined and compared the distribution of assimilates with respect to the total amount and proportions of individual carbohydrates in the spectrum (analysis of mature and young leaves, roots, phloem exudates and vascular tissue analysis). Last but not least I described the diurnal dynamics of soluble sugars and starch in mature leaves. Although not many differences were found in net photosynthetic rates, the two studied genotypes differed in growth rates – glycophytic species grew faster than the halophytic one. I observed differences also in saccharide allocation to individual organs, the *P. maritima* leaves contained more soluble sugars (including sorbitol) than *P. lanceolata* plants. The genotypes varied in diurnal carbohydrate balance, when *P. maritima* plants preserved larger amount of starch compared to *P. lanceolata* at the end of the night.