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STEM HYDRAULIC CONDUCTANCE IS INFLUENCED BY LIGHT - EXPERIMENTAL EVIDENCE FROM SILVER BIRCH (BETULA PENDULA)

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Stem hydraulic conductance (Kstem) has previously been shown to depend mainly on the anatomical features of xylem conduits and the possibility of rapid flow control in xylem has not been considered. Here we report evidence for short-term changes in Kstem for silver birch (Betula pendula) related to light conditions. First we sampled shoots cut from lower (shade shoots) and upper (sun shoots) thirds of naturally growing ~25-year-old forest trees. Before hydraulic measurements the shoots were exposed to photosynthetic photon flux density (PPFD) of 70, 140, 330 or 610 μmol m⁻² s⁻¹ for 7 h. Both canopy position (long-term effect) and incident PPFD (short-term effect) had a significant impact on Kstem. Sun shoots exhibited consistently higher Kstem compared with shade shoots. For both canopy positions maximum values of Kstem were recorded at PPFD of 330 μmol m⁻² s⁻¹. In a second experiment conducted in 4-year-old saplings growing in an experimental plantation, Kstem as well as potassium ion concentration ([K⁺]) in xylem sap varied considerably along the canopy vertical profile, both increasing from bottom to top in accord with the light availability gradient in the canopy; there existed a strong relationship between Kstem and [K⁺]. These results suggest that Kstem is dynamic on a short time scale and that potassium is involved in the regulation of Kstem in relation to light availability.

FRUCTAN REGULATION IN TIMOTHY (PHLEUM PRATENSE L.) AS AFFECTED BY STAGES OF DEVELOPMENT AND BY WILTING

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In temperate grasses chloroplastic starch accounts for about 15% of non-structural carbohydrate (NSC). The predominant NSCs are vacuolar sucrose and fructans. Fructans are known to have a role in physiological responses to low temperatures and regrowth after defoliation. Fructan degradation during silage contributes to forage preservation and studies suggest that plant fructan exohydrolases (FEHs) are partially responsible for that degradation. However, fructan breakdown by plant enzymes in harvested tissues as well as the availability of soluble sugars during storage are little documented. Here, FEH activity and NSC profiles, including starch, were evaluated during development (vegetative growth, stem elongation, heading and anthesis) and during 24 hours of wilting after cutting for the last two stages in leaves and stems of timothy. This study shows that whereas starch content decreases, fructan content increases with growth being maximal at anthesis in N non-limiting conditions. After cutting, fructan content was relatively stable and FEH activity low, possibly due to desiccation. Besides, three putative FEH coding genes were isolated from cDNA library on these same tissues. Expression analysis of the putative FEH transcript levels and functional characterization by heterologous expression in Pichia pastoris of the corresponding genes are in progress to complete this study.

MICROTUBULE (+)-END-ASSOCIATED PROTEIN FROM SOLANACEAE INTERACTING WITH POTYVIRAL HELPER COMPONENT PROTEINASE

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