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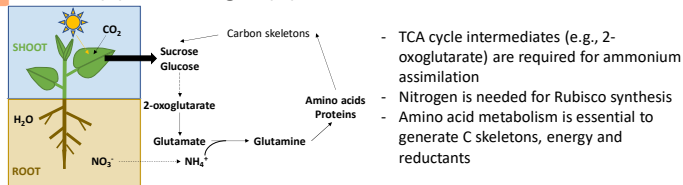
Linking sugar transport and nitrogen remobilization and use efficiency in Arabidopsis

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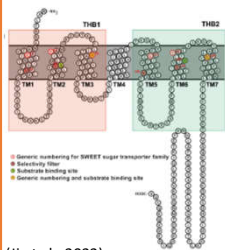
Introduction

Carbon (C) and Nitrogen (N) metabolisms are interconnected



But what about the connexion between sugar transport and N allocation and *vice versa*?

SWEET transporters are sugar facilitators

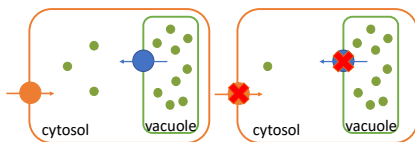


The SWEET proteins were discovered as sugar facilitators able to transport glucose, fructose and/or sucrose between cells (Chen et al., 2010). They are involved in plant development and plant response to abiotic and biotic stresses (for review see Xue et al., 2022).

(Li et al., 2022)

How perturbations of the intercellular and intracellular sugar transport affect plant growth and development?

Sugars availability in the cell is controlled by transporters activity at the plasma membrane and the tonoplast



SWEET11/SWEET12 and SWEET16 transport hexoses and sucrose at the plasma membrane or at the tonoplast and SWEET17 is a tonoplasmic fructose-specific transporter (Chen et al., 2010; Klemens et al., 2013; Chardon et al., 2013; Le Hir et al., 2015)

Methodology

Plant

- Growth parameters (stem height, diameter, DW)
- C and N percentage in rosette leaves, stem and seeds
- ¹⁵N labeling experiment

Morphometric analysis of the vascular system

Organ

Tissue

Reverse genetic approach with double and quadruple sweet mutant lines

Multiscale approach from plant to cell level

Conclusions

Intracellular sugar exchanges mediated by SWEET16 and SWEET17 specifically impact the vascular system development but not the N distribution

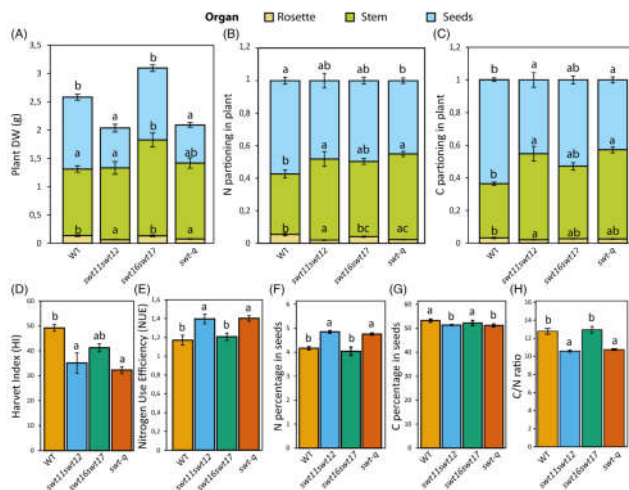
swt11swt12 is impacted in vascular development and displays an improved NUE and nitrogen remobilization to the seeds.

Xylem defects in the stem constitute a bottleneck for the amino acids transfer to the seeds (increased amino acids content in stem)

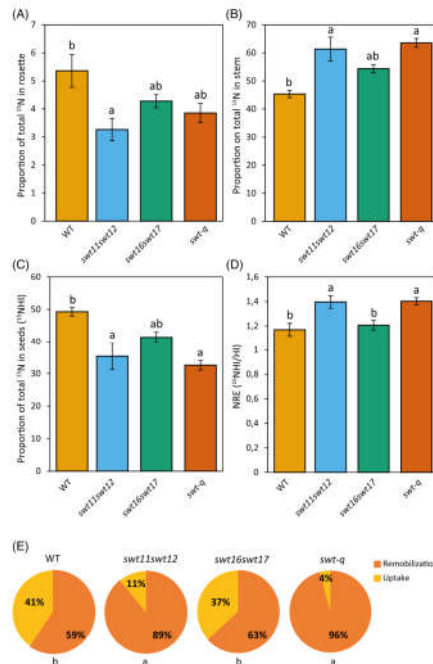
Finally, less C reached the seeds most probably because C is not loaded or remobilized properly in the phloem sap from the stem and accumulates as soluble sugars and starch.

Main results

SWEET genes modulate plant biomass, yield and NUE



Nitrogen remobilization efficiency is partly dependent from SWEET genes



Mutation in SWEET genes affects vascular bundle development

