# Deregulation of apoplastic or symplastic steps in sugar loading and transport in Arabidopsis thaliana

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## Authors

Françoise Vilaine [1], *, Laurence Bill [1], Rozenn Le Hir [1], Beate Hoffmann [1], Catherine Bellini [1,2], and Sylvie Dinant [1]

## Affiliations

[1] Institut Jean-Pierre Bourgin, INRAE, AgroParisTech, Université Paris-Saclay, 78000 Versailles, France

[2] Umeå Plant Science Centre, Department of Plant Physiology, Umeå University, 90187 Umeå, Sweden



## Abstract

In addition to their role as nutrients, sugars perform a multitude of functions and influence many processes. They play a crucial role in establishing sap flow and long-distance transport, in adjusting plant development in response to the environment or during stress. The composition of the phloem sap is a determining parameter for yield and biomass.

This work aimed to dissociate different steps of sugar loading and transport in *Arabidopsis*, involving either active transport (apoplastic component) or passive flow through plasmodesmata (symplastic component). Depending on the plant species, the environmental conditions, the stage of development, it would seem that both pathways are operational, although it is not well known what makes one or the other really used.

We generated different Arabidopsis lines deregulated specifically in certain apoplastic and symplastic components of the loading and transport of sugars. It made it possible to highlight distinct impacts, depending on the component affected, on the growth and physiology of the plant, on the homeostasis of sugars, on the composition of phloem sap and apoplast content, on seed filling, and on the expression of genes involved in the transport and metabolism of sugars.

The main questions and perspectives of this work, concern the compensatory mechanisms set up to maintain the phloem sap composition and the regulation of the balance between apoplastic and symplastic pahways during development and stress conditions.

Ultimately, it can be assumed that the knowledge acquired will make it possible to develop innovative solutions to improve the distribution and use of resources, and thus the yield and tolerance to biotic and abiotic stresses of plants.