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Abstract

Phytoplasmas inhabit phloem sieve elements, and cause abnormal growth and altered sugar partitioning. But how they interact with phloem functions is not clearly known. The phloem responses were investigated in tomato infected by 'Candidatus Phytoplasma solani', at the beginning of the symptomatic stage, the first symptoms appearing in the newly-emerged leaf at the stem apex. Antisense lines impaired in the phloem sucrose transporters SUT1 and SUT2 were included. In symptomatic sink leaves, leaf curling was associated with higher starch accumulation and expression of defense genes. The analysis of leaf midribs of symptomatic leaves indicated that transcript levels for genes acting in the glycolysis and peroxisome metabolism differed from these in non-infected plants. The phytoplasma also multiplied in the three lower source leaves even if it was not associated with symptoms. In these leaves, the rate of phloem sucrose exudation was lower for infected plants. Metabolite profiling of phloem sap-enriched exudates revealed that glycolate and aspartate levels were affected by the infection. Their levels were also affected in the non-infected SUT1- and SUT2- antisense lines. The findings suggest a role of sugar transporters in the responses to the infection and describe the consequences of impaired sugar transport on primary metabolism.