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Turnip yellows virus (TuYV) is a polerovirus (*Luteoviridae* family) restricted to phloem tissue and obligatorily transmitted by aphids. Virions are acquired when aphids ingest sap from infected plants. Virus particles cross the gut epithelium and the accessory salivary gland cells before being released, together with saliva, into the plant. This highly specific transcytosis mechanism relies on the presence of virus receptors on the surface of the aphid cells.
In order to identify TuYV receptors in *Myzus persicae*, the screening of different aphid cDNA libraries was conducted by yeast two hybrid using virus structural proteins as baits. A nuclear protein (ALY) and a membrane protein (FN3) were identified as potential virus partners.
Involvement of FN3 and ALY in virus uptake by the aphid was evaluated by developing an RNAi-based technique using transgenic plants expressing RNA hairpins targeting the aphid genes. Aphids were fed on these plants before being loaded with TuYV using artificial feeding on purified virus. Viruliferous aphids were then transferred to test plant to assess their ability to transmit the virus.
A reduction of FN3 mRNA accumulation was observed in aphids fed on *A. thaliana* transformed with the FN3-hairpin. The FN3-silenced aphids ingested similar amount of virus compared to control aphids, but remarkably, the level of virus internalization in the silenced aphids was reduced, showing that inhibition of FN3 expression altered virus internalization in the aphids and subsequently affected the virus transmission efficiency. Concerning ALY protein, although no reduction of ALY mRNA accumulation was observed in whole aphids fed on *A. thaliana* transformed with the ALY-hairpin, the aphids also transmitted TuYV at a lower efficiency. It is conceivable that reduction of ALY-mRNA is restricted to the intestinal cells and that this reduction cannot be observed when using whole aphid extracts. Quantification of ALY-mRNA needs to be reproduced on isolated digestive tubes.
Overall, these experiments identified two aphid proteins that could be involved in TuYV transmission by *M. persicae*.