



HAL
open science

A plant-specific homolog of DP1/Yop1 family proteins plays a proviral role in potyvirus infection

Mingshuo Xue, Luc Sofer, Vincent Simon, Roxane Lion, Nathalie Marissal-Arvy, Mamoudou Diop, Jean-Luc J.-L. Gallois, Jens Tilsner, Sylvie German-Retana

► To cite this version:

Mingshuo Xue, Luc Sofer, Vincent Simon, Roxane Lion, Nathalie Marissal-Arvy, et al.. A plant-specific homolog of DP1/Yop1 family proteins plays a proviral role in potyvirus infection. 19èmes Rencontres de Virologie Végétale, Aussois, France, Jan 2023, Aussois, France. hal-04647892

HAL Id: hal-04647892

<https://hal.inrae.fr/hal-04647892v1>

Submitted on 15 Jul 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

A plant-specific homolog of DP1/Yop1 family proteins plays a proviral role in potyvirus infection

Mingshuo Xue¹, Luc Sofer¹, Vincent Simon¹, Roxane Lion¹, Nathalie Arvy¹, Mamoudou Diop², Jean-Luc Gallois², Jens Tilsner^{3,4} and Sylvie German-Retana¹

¹ UMR 1332, Biologie du Fruit et Pathologie, INRAE, Univ. Bordeaux, Equipe de Virologie, 71 avenue Edouard Bourlaux, CS 20032, 33882 Villenave d'Ornon Cedex, France

² UR 1052, GAFL Domaine St Maurice – CS, 60094 - F-84143, Montfavet Cedex

³ Cell and Molecular Sciences, James Hutton Institute, Dundee, DD2 5DA, Scotland, U.K.

⁴ Biomedical Sciences Research Complex, University of St Andrews, North Haugh St Andrews, Fife KY16 9ST, Scotland, U.K.

The *Potyvirus* genus is one of the largest genera of plant RNA viruses responsible for serious diseases in crops worldwide. As potyviruses developed strategies to hijack the host secretory pathway and plasmodesmata (PD) for their transport, the goal of this study was to identify membrane and/or PD-proteins that interact with the 6K2 protein, a potyviral protein involved in replication and cell-to-cell movement of turnip mosaic virus (TuMV).

Using Split-ubiquitin membrane Y2H assays we screened an Arabidopsis cDNA library for interactors of the TuMV-6K2. We isolated AtHVA22a (*Hordeum vulgare abscisic acid* responsive gene 22) that belongs to a multigenic family of transmembrane proteins, homologous to DP1/Yop1 family proteins in yeast and interactors of reticulons. HVA22 DP1/Yop1 family genes are widely distributed in eukaryotes, but the role of HVA22 proteins in plants are not well-known, except the role in blast disease resistance recently described in rice [1]. Interestingly, proteomics analysis of PD fractions purified from Arabidopsis suspension cells showed that AtHVA22a is highly enriched in plasmodesmata proteome, making it a good candidate for the virus cell-to-cell movement [2]. We further confirmed the interaction between 6K2 and AtHVA22a in yeast, as well as *in planta* by using bimolecular fluorescence complementation (BiFC). Furthermore, we showed that the 6K2/AtHVA22a interaction occurs at the level of the viral replication complexes (VRC) during TuMV infection and partially at PD. The partial relocalization of AtHVA22a at the VRC during TuMV infection seems to be specific to *potyvirus* infection as it is not induced on *potexvirus* infection. Finally, we showed that the propagation of TuMV in arabidopsis leaves is increased when AtHVA22a is overexpressed in planta but slowed down upon inactivation of AtHVA22a by CRISPR-Cas9.

Altogether, our results indicate that AtHVA22a plays an agonistic effect on TuMV propagation.

[1] doi: 10.1016/j.celrep.2022.110941.

[2] doi: 10.15252/embr.201847182.