

A PHYTOPLASMA EFFECTOR TARGETS SPECIFIC PLANT TRANSCRIPTION FACTORS TO PROMOTE PROGENY PRODUCTION OF PHYTOPLASMA LEAFHOPPER VECTORS

Akiko Sugio; Heather N. Kingdom; Allyson MacLean; Victoria M. Grieve; Saskia A. Hogenhout.

Department of Disease and Stress Biology, The John Innes Centre, Norwich Research Park, Norwich, NR4 7UH, United Kingdom. akiko.sugio@bbsrc.ac.uk

Phytoplasmas are insect-transmitted plant pathogenic bacteria that can induce dramatic changes in plant morphology and alter the fitness and behaviour of their insect vectors. We found that *Arabidopsis thaliana* infected with Aster Yellows phytoplasma strain Witches' Broom (AY-WB) produces many axillary stems (witches' broom symptoms). Furthermore, the generalist leafhopper *Macrostelus quadrilineatus*, which vectors AY-WB, and the maize specialist leafhopper *Dalbulus maidis*, which normally does not use *Arabidopsis* as a host plant, produced more progeny on AY-WB-infected *Arabidopsis*. We hypothesized that AY-WB phytoplasma produce virulent proteins (effectors) that modulate specific host targets leading to the changes in plant morphology and insect vector fitness. Previously, we sequenced and mined the genome of AY-WB and identified 56 candidate effectors. The *Arabidopsis* lines that express one of the effectors, SAP11, produced curly leaves and many stems. Furthermore, *M. quadrilineatus* produced more nymphs on SAP11 expression lines. We revealed that SAP11 binds and destabilizes *Arabidopsis CINCINNATA (CIM)*-related TCP transcription factors, which control plant development and promote the expression of lipoxygenase (*LOX*) genes, which in turn are required for jasmonate (JA) synthesis. *LOX* expression and JA production were reduced in the SAP11 expression lines. Furthermore, *M. quadrilineatus* produced more offspring on *Arabidopsis* JA synthesis and response mutants. Thus, SAP11 suppresses the JA mediated defense response to *M. quadrilineatus* by destabilizing TCPs leading to an increased number of the insect. As AY-WB relies on insect vectors for transmission, we hypothesize that SAP11 promotes AY-WB dispersal in nature by increasing *M. quadrilineatus* numbers. Unlike *M. quadrilineatus*, *D. maidis* did not increase its fecundity or survival rate on SAP11 expressing lines, indicating that in addition to SAP11 other AY-WB effectors may modulate *Arabidopsis* resistance to the non-host leafhopper, *D. maidis*.

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