Aphids curtail the impact of feeding damage by limiting oligogalacturonide release and suppressing cell wall associated immunity

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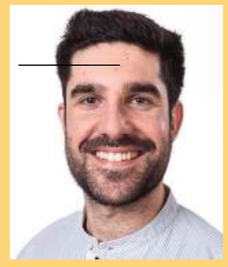


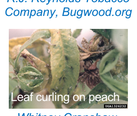
BACKGROUND

i) The green peach aphid *Myzus persicae* is an important crop pest worldwide

Polyphagous on >400 plant species

Direct feeding damage

R.J. Reynolds Tobacco Company, Bugwood.org



Whitney Cranshaw, CSU, Bugwood.org

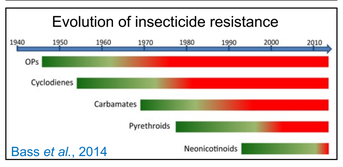
Transmission of more than 100 viruses

Zitter and Murphy, 2009

De Mori *et al.*, 2020

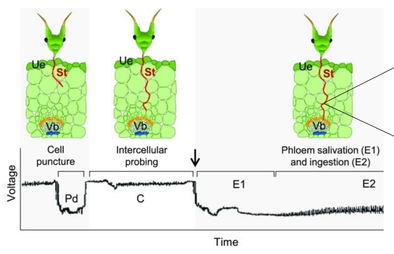
Agrios, 2005

Evolution of insecticide resistance

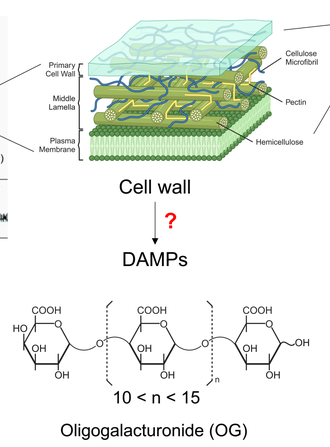


Bass *et al.*, 2014

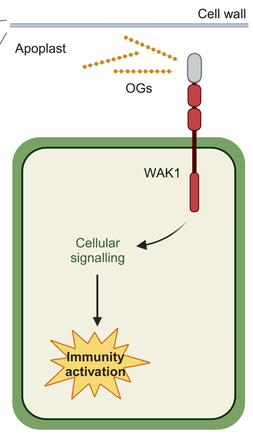
ii) Aphid stylets penetrate cell walls during feeding – are OGs/DAMPs released?



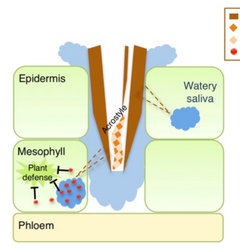
Silva-Sanzana *et al.*, 2019



Oligogalacturonide (OG)



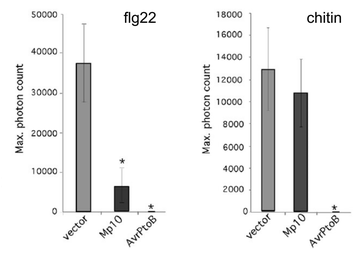
iii) Aphid stylets deposit saliva containing small effector proteins into plant cells



Mugford *et al.*, 2016
Deshoux *et al.*, 2022

Quick release of the Mp10 effector from within the tip (acrostyle) of the aphid stylets during a probe of a mesophyll cell

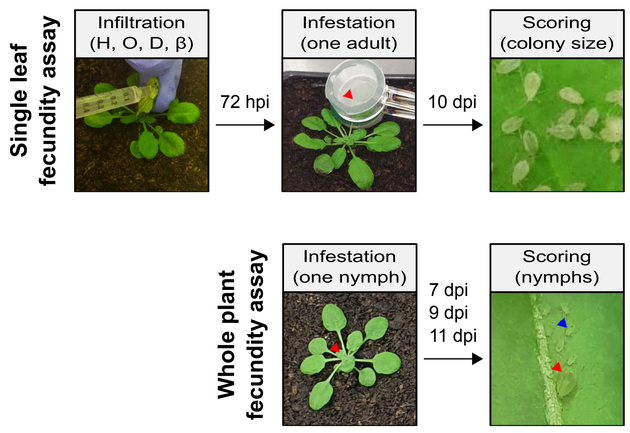
Mp10 suppresses the oxidative burst induced by flg22, but not chitin

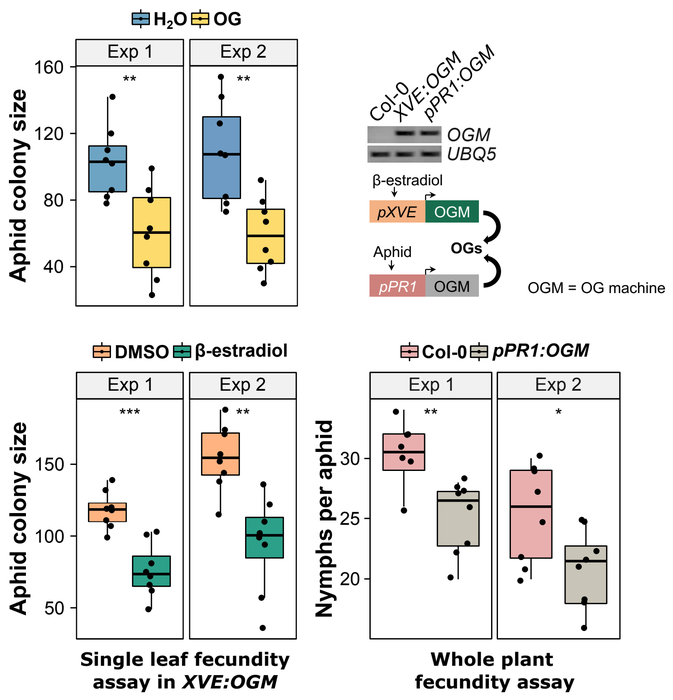


Bos *et al.*, 2010

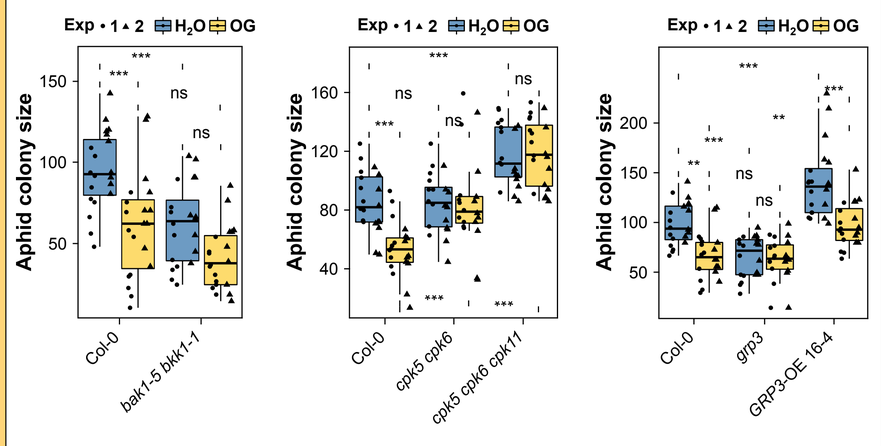
RESULTS

1. *Myzus persicae* fecundity is reduced on *Arabidopsis thaliana* plants exposed to OGs

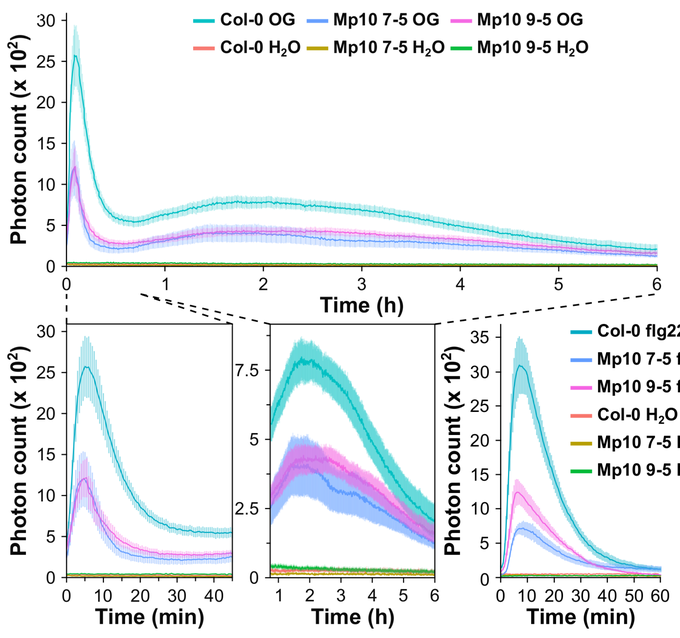


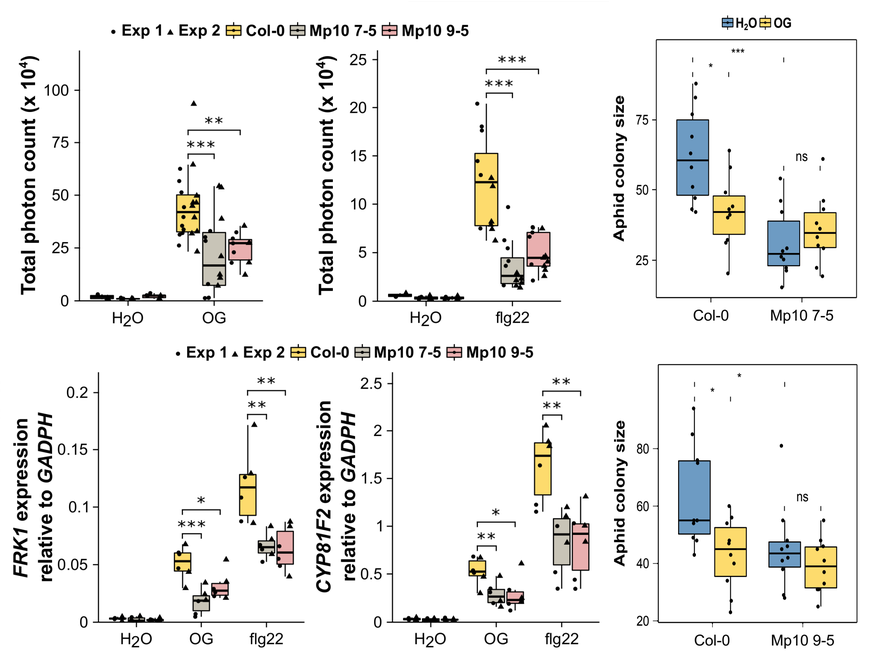


2. The OG-induced reduction of aphid fecundity on Arabidopsis is dependent on BAK1/BKK1, CPK5/6, and GRP3

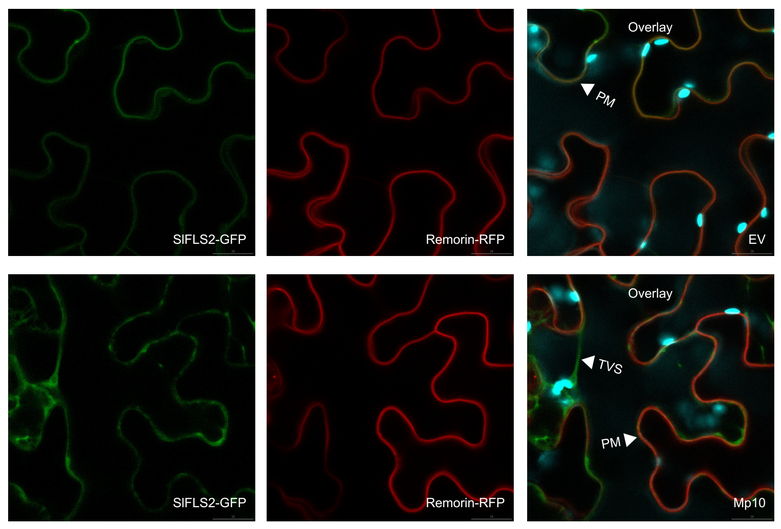


3. The aphid effector Mp10 suppresses the OG-induced PTI



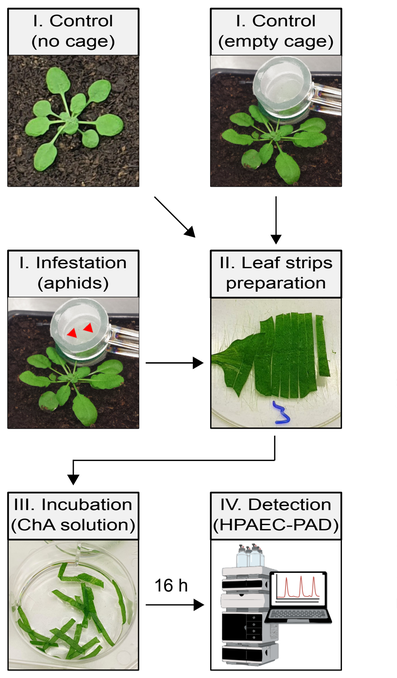


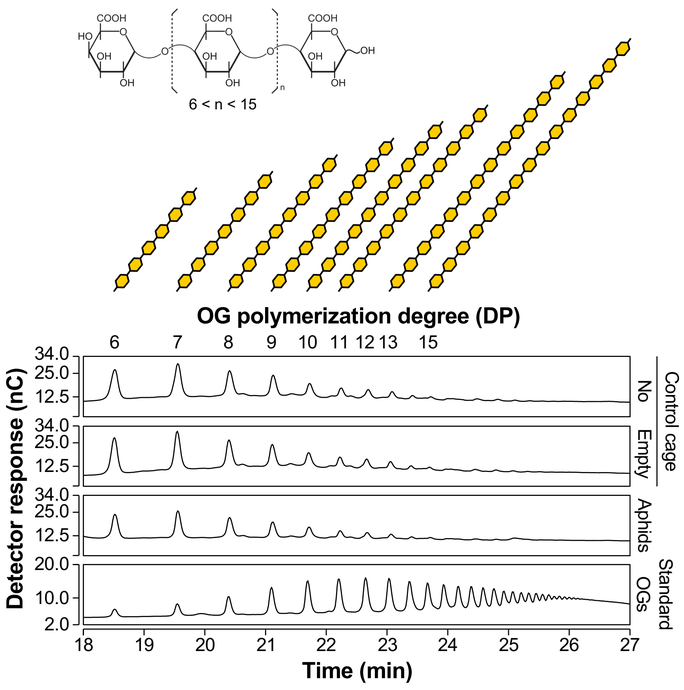
4. Mp10 affects localization of PRR receptors

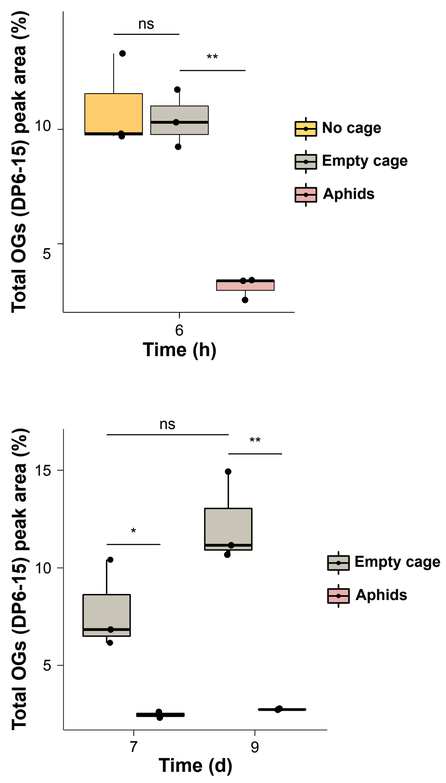


Different localization pattern of FLS2 in presence of Mp10, compared to empty vector (EV), after agroinfiltration in *Nicotiana benthamiana* leaves. PM, plasma membrane; TVS, trans-vacuolar cytoplasmic strand. Remorin, PM marker.

5. *In vivo* accumulation of long OGs is suppressed during aphid colonization of Arabidopsis

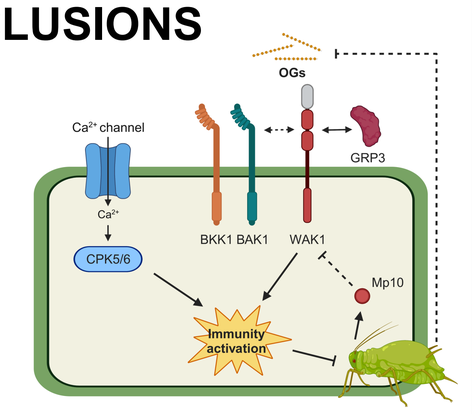






CONCLUSIONS

- Oligogalacturonides (OGs) DAMPs activate immunity against aphid colonization in a BAK1/BKK1-, CPK5/6-, and GRP3-dependent manner
- Aphids deposit the Mp10 effector in the cytoplasm of plant cells during probing
- Aphid effector Mp10 suppresses PTI via mis-localization of PRR receptors
- Elicitor-active OGs are suppressed in aphid-infested leaves



Acknowledgments

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