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Specificity of eIF4E factors towards resistance to potyviruses in *Arabidopsis thaliana*

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The translational initiation factors eIF4E represent the main resistance to *Potyvirus* as well as to other families of plant RNA virus. Although those factors are encoded by small multigenic families, it has been shown that each virus can only use specific eIF4E to perfom its cycle in plants. Often, this coincides with the ability of the virus VPg to interact with those host proteins. Using *Arabidopsis* transgenic approaches, we aimed at better understanding the basis of the virus specificity for eIF4E.

First, we looked at the interaction pattern of the *Clover Yellow Vein Virus* (ClYVV) VPg with all five *Arabidopsis* eIF4E proteins and found that it interacts with three of them. However, *Arabidopsis* mutant studies have shown that only *eIF4E1* is necessary to allow ClYVV infection. This suggests that unlike what has been shown for other plants (as pepper and tomato), not only the eIF4E protein sequence but also its gene expression pattern may have a key role in susceptibility, as we investigated by studying various eIF4E over-expressions.

Then we looked at a case in which the same virus can use very different eIF4E in separate species: the *Tobacco Etch Virus* (TEV) relies on eIF4E1 in tomato and pepper but on its isoform eIFiso4E in *Arabidopsis*. To see whether this specificity depends on those eIF4E isoforms only, or rather on a more general host protein complex, we over-expressed pepper eIF4E in TEV-resistant *Arabidopsis* to see whether it can restore host susceptibility to TEV.

As a result from those idiosyncratic eIF4E requirements, broadening the resistance spectrum of plants to viruses may require the inactivation of different *eIF4E* genes, a process which may be detrimental to the plant development. Indeed, we show that the double mutant *eif4e1*; *eifiso4e* is lethal in *Arabidopsis*. As an alternative, we aimed at creating new resistance alleles in *Arabidopsis* by mimicking natural –and possibly functional- resistance alleles that have been characterized in other species. We hope this may help developing new resistances alleles to *Potyvirus*, including in plants species for which none has been described so far.

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