Researchers find tobacco protein enhances crop immune systems

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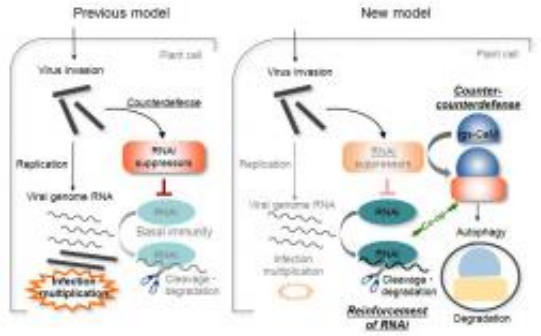
The tobacco plant's protein could be used to enhance existing crop immune systems. Credit: Dennis Tang

A study led by Associate Prof. Kenji Nakahara at Hokkaido University in Japan has found a component in tobacco that makes crop immune systems more resistant to viral attacks.

Although crops have a general defense mechanism in order to fight against viruses, their invaders counteract this defense by suppressing the plant immune response. Evidence from recent studies implied that plants have developed an additional set of countermeasures to combat the virus's immune suppression tactics.

In order to examine how plants do this, the researchers set out to find the mechanisms involved. Their results appear in the *Proceedings of the National Academy of Sciences* (*PNAS*).

They found rgs-CaM, otherwise known as "tobacco calmodulin-like protein", a calcium-binding messenger protein (Calmodulin is an abbreviation for "CALcium MODulated proteIN). In tobacco this protein binds to the viral (RNA interference) suppressors (molecules produced by the virus that chemically counteract the plants' own defenses) and inhibits the virus from impeding the plant's defenses.



Tobacco calmodulin-like protein binds to RNAi suppressors and sequesters them in corporation with autophagy, allowing RNAi, which was previously attenuated by the suppressors, to operate the defense mechanism properly. Credit: Kenji S. Nakahara

These findings have the potential to enhance the immune systems for crops that are vulnerable to pesticide-resistant viruses. The results of this research may well have an impact beyond tobacco crops. "Because most viruses encode RNAi suppressors, this study may contribute to the development of a molecular breeding strategy to confer resistance other viruses in crops," said Associate Prof. Nakahara.

More information: Kenji S. Nakahara, Chikara Masuta, Syouta Yamada et al. Tobacco calmodulin-like protein provides secondary defense by binding to and directing degradation of virus RNA silencing

suppressors. *Proceedings of the National Academy of Sciences*. 2012 Jun 19;109(25):10113-8. Epub 2012 Jun 4. doi: 10.1073/pnas.1201628109