Scientists create virus-resistant tomato plants

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The Tomato, (Lycopersicon lycopersicum) flowering, associated with a young, developing fruit. Credit: Earth100/Wikipedia

Researchers of Valencia's Polytechnic University (UPV) and the Spanish National Research Council (CSIC) have used tools that regulate gene expression in order to produce tomato plants that are resistant to the

spotted wilt virus (TSWV), thus proving the usefulness of this type of strategy to generate crops that are resistant to viral infections. The results of this project have been published in *The Plant Journal*.

The gene silencing mediated by RNA or RNAi allows for the selective activation or deactivation of genes; in pants, it has been successfully used to induce resistance to some viruses.

Alberto Carbonell, researcher at the IBMCP, says, "One of the most successful RNAi-based antiviral techniques consists of inducing the expression of small artificial RNAs designed to inhibit the replication of the most viral RNAs in plants. In this study, we have worked with two types of small artificial RNAs, artificial microRNAs or amiRNAs, and synthetic trans-acting small interfering RNAs, or syn-tasiRNAs. Then we compared the level of resistance to TSWV in plants that express a single antiviral amiRNA and of plants that simultaneously express four antiviral syn-tasiRNAs, each with a different target location."

The work of the IBMCP researchers has shown that plants that express a single antiviral amiRNA are more susceptible to TSWV due to the fact that the virus easily accumulates mutations in the amiRNA's target location, which allows it to evade its action and continue with the infection. On the other hand, a majority of plants that simultaneously express four antiviral syn-tasiRNAs are totally resistant to TSWV, probably due to the combined effect of each syn-tasiRNA.

"We believe that the probability of the virus accumulating mutations simultaneously in the four target locations is very small. With our work, we have been able to produce tomato plants that are resistant to TSWV, as well as proving the use and suitability of the strategy based on syn-tasiRNAs to generate crops that are resistant to viral infections," concludes Carbonell.

More information: Alberto Carbonell et al. Multi-targeting of viral RNAs with synthetic trans -acting small interfering RNAs enhances plant antiviral resistance, *The Plant Journal* (2019). DOI: 10.1111/tpj.14466

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