



VIRTIGATION – Emerging viral diseases in tomatoes and cucurbits: Implementation of mitigation strategies for durable disease management

Deliverable 5.2 Potential mild ToBRFV isolates

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1 PUBLISHABLE SUMMARY

Within VIRTIGATION WP5 T2, the partners Julius-Kuehn Institute (JKI), Volcani Centre (VC), DCM corp (DCM) and Scientia Terrae VZW (ST) are exploring the possibility to develop a cross-protection strategy against the Tobamovirus tomato brown rugose fruit virus (ToBRFV) for control of the virus in tomato crop. ToBRFV has recently spread worldwide and caused severe disease symptoms in tomato production. In order to optimize the chance of finding a suitable cross-protection candidate isolate, different research strategies were applied:

- Naturally occurring ToBRFV isolates were screened in order to identify potential mild isolates, i.e. isolates causing no or only mild symptoms (DCM, ST).
- Attenuated isolates were created by applying:
 - o Beta-irradiation at various intensities (VC)
 - o Chemical mutagenesis (JKI)
 - o Temperature selection (DCM, ST)

The natural and attenuated isolates were phenotyped to identify potential mild variants. As a result, 2 natural isolates and 4 attenuated isolates were selected for further research based on their mild symptom profiles. Consequently, proof-of-concept trials performed by DCM, ST and VC showed that pre-infection with either natural or attenuated isolates was able to protect tomato plants from later infection with a genotypically and phenotypically distinct, aggressive ToBRFV wild-type isolate.

While the first results are promising, further research is needed to prove that these isolates are stable in the long term (genetically and phenotypically) under all environmental conditions, in different cultivars and under different stressors to ensure that the selected cross-protection candidate is stable and mild under all conditions. In addition, any selected cross-protection candidate will need to go through a rigorous authorization procedure, including a thorough risk assessment, proof of efficacy, quality control, ..., before it can become a registered plant protection product and be delivered to the market. The current quarantine status of ToBRFV means that purposeful application of ToBRFV outside of a quarantine environment is prohibited and punishable by law.