Investigation of ToBRFV as part of the VIRTIGATION project

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Curcubitacea and tomatoes are among the most important food crops in the EU and worldwide. In the year 2020 tomatoes were the leading vegetable crop worldwide with a production volume of 187 million metric tons. Cucumber, eggplant and pepper were among the top ten of this list. This highlights the importance of a sustainable production for these cultures.

The EU project VIRTIGATON deals with emerging viral diseases in tomatoes and curcubits and aims to implement mitigation strategies for durable disease management. One of the main focus areas of this project is the tomato brown rugose fruit virus (ToBRFV). It was first encountered in 2014 and described as a new virus species in 2016. Since then it has spread in Europe, Asia and America and is currently present in 34 countries, according to the EPPO database. It can overcome the $Tm2^2$ resistance, which is commonly used in commercial tomato cultivars. It confers resistance against tobamo viruses, such as the tobacco mosaic virus.

ToBRFV has the potential to cause relevant economic losses to tomato growers worldwide.

To gain a better understanding of the virus and its pathogeny factors, an infectious clone is being developed at the JKI. To that end, the full length viral genome has been cloned in a binary vector using Gibson assembly. The viability of this method has been demonstrated by Ma et al. in 2021 with a ToBRFV isolate from Yunnan. Here, an Israeli and a German isolate will be used.

Mutations will be induced in the viral genome and a screening for attenuated strains will be conducted.

These will be useful tools for a better understanding of the impact of sequence variation in different virus strains and to study virus host interaction.