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Tomato brown rugose fruit virus

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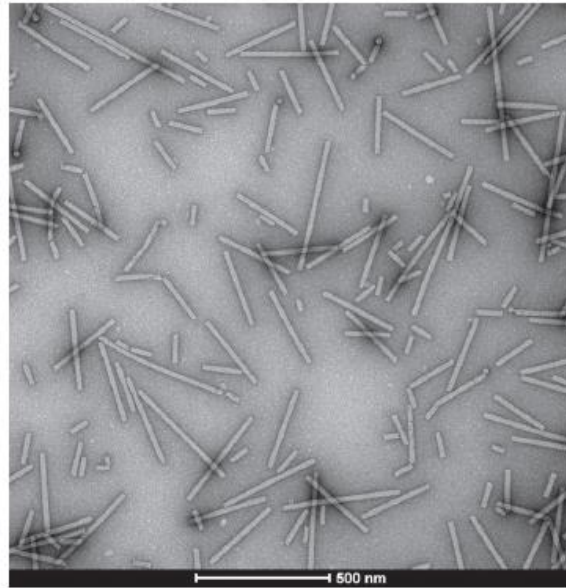
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ToBRFV



- ToBRFV belongs to group of tobamoviruses
- Tobamoviruses include tobacco mosaic virus (TMV), tomato mosaic virus (ToMV), cucumber green mottle mosaic virus (CGGMV), odontoglossum ringspot virus (ORSV) and many more
- **ToBRFV infects plants that are resistant to TMV and ToMV!**

Structure of tobamoviruses

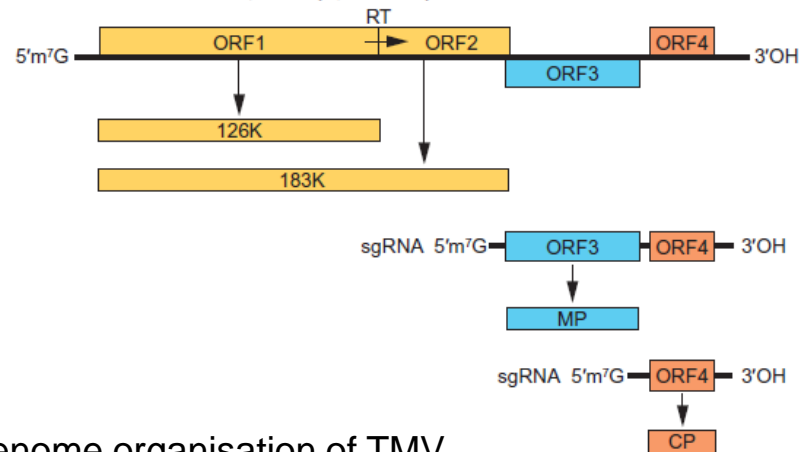


Purified ToBRFV particles;
courtesy Dr. Richert-Pöggeler



Helical RNA surrounded by capsid subunits
(9th Report of the ICTV, 2012)

Tobacco mosaic virus, TMV (6,395 nts)



Genome organisation of TMV
(9th Report of the ICTV, 2012)

Distribution



- First occurrence in Jordan (2015), followed by Israel (2014 but reported 2017)
- Germany in August 2018 -> first report from Europe
- Sicily, California, Mexico

German situation



- Tomato growers in Northrhine-Westfalia were affected (more than 25 ha greenhouse production)
- Rapid spread of infection within greenhouses and between production sites
- PRA identified **high phytosanitary risk** → ToBRFV to be treated as quarantine pathogen
- No further reports so far

Host plants



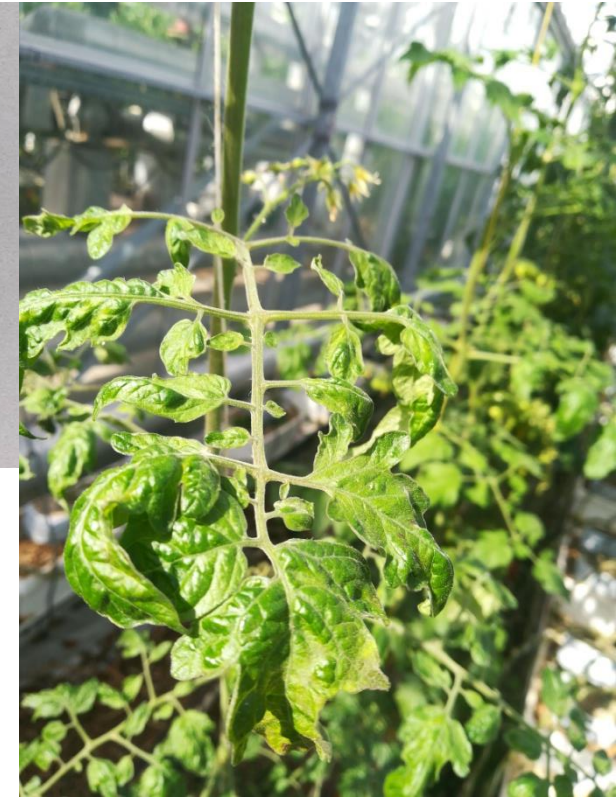
- Tomatoes, even if resistant to TMV/TomV
- Bell pepper
- Petunia
- *Solanum nigra* (black nightshade)
- Tobacco
- ...

Symptoms



- On leaves quite unspecific or asymptomatic
- Sometimes mosaic, smaller leaves
- Symptoms on fruits more prominent: brownish/yellowish discoloration
- Other viruses (pepino mosaic virus, physostegia chlorotic mottle virus) may cause similar (unspecific) symptoms
- Effects of intentional inoculation of PepMV mild strains on ToBRVF symptomology not known

Symptoms



Photographs courtesy
Monika Heupel

Transmission



- By seeds
- By mechanical means:
tools, hands, packaging boxes, knives,
closed irrigation systems,...
- Extremely stable particles – smokers!

RECOVERY OF CULTURABLE TOBACCO MOSAIC VIRUS FROM SPUTUM AND THORACENTESIS FLUIDS OBTAINED FROM CIGARETTE SMOKERS WITH A HISTORY OF PULMONARY DISEASE¹

The idea of a possible association between tobacco mosaic virus and human disease has been a subject of debate for many years.²⁻⁵

In 1960, Katsilambros⁶ reported some interesting data. He skin tested 23 smokers and 49 nonsmokers with tobacco mosaic virus. None of the smokers gave a positive skin-test reaction, however, intense

TABLE 1
RECOVERY OF CULTURABLE TOBACCO MOSAIC
VIRUS FROM SPUTUM SPECIMENS AND
THORACENTESIS FLUIDS

| | Results of | Results of Con- firm- |
|--|---------------|-----------------------------|
| | | |

Diagnostics



- RT-PCR using group-specific tobamovirus primers followed by sequencing ([Li et al. 2018](#), [Menzel et al. 2019](#), [Dovas et al. 2004](#))
- ⚡ Some primer pairs produce non-specific bands, even from healthy controls
- ToBRFV-specific primers ([Luria et al., 2017](#)) might not detect all existing strains
- Antisera cross-reacting with other tobamovirus – no specific detection
- Electron microscopy (also non-specific)

Prevention/Treatment



- **No resistant** tomatoes known →
- Hygiene, hygiene, hygiene!
- Close observation of new young plants or other plant material → if in doubt, contact your plant health advisor
- If ToBRFV infection is confirmed – all plant material needs to be burnt not composted (tobamoviruses are not inactivated by composting)
- Desinfection of all tools, tables, trays,... but: only one product licenced in Germany

Prevention/Treatment



- Do not reuse rockwool/other substrates
- Only little experience available regarding treatment of irrigations water (UV disinfection, filters, heat treatment) – may reduce virus load but not eliminate