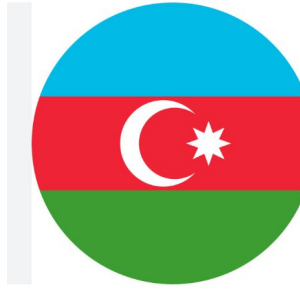


EPPO Jens-Georg Unger Plant Health Fellowship (Feb. 2024-July 2024)



**Investigation on the seed transmissibility of Tomato Spotted Wilt Virus (TSWV)
in pepper and tomato seeds**

ABOUT ME

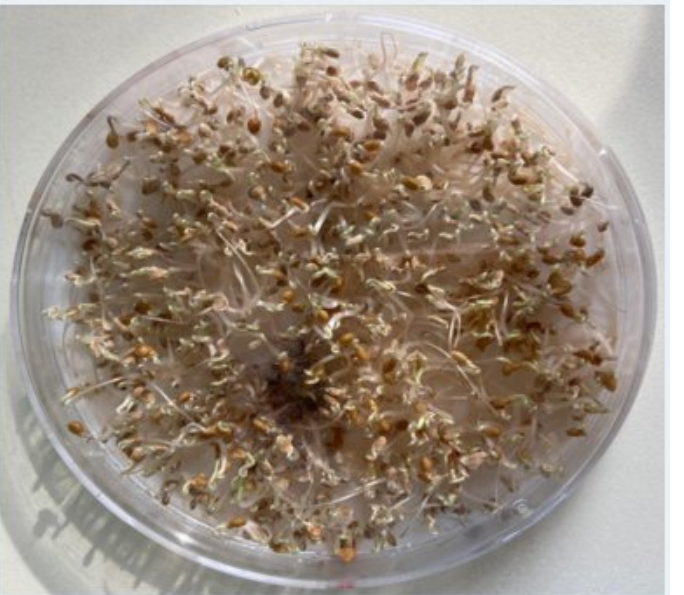
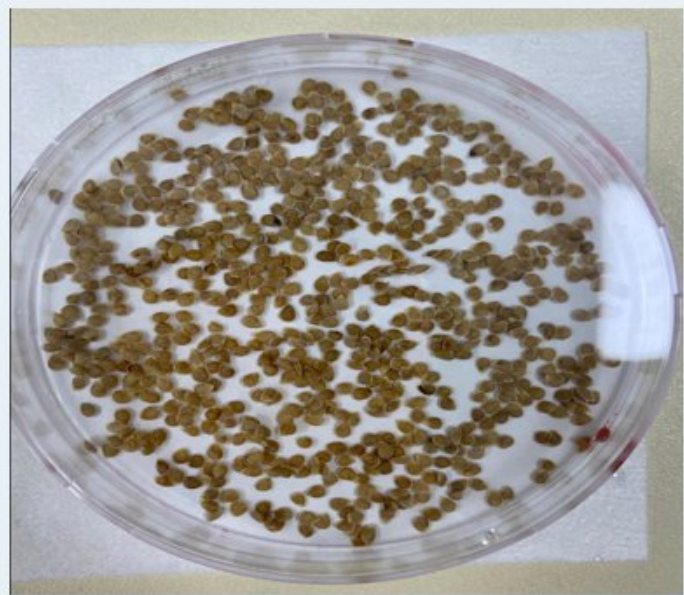
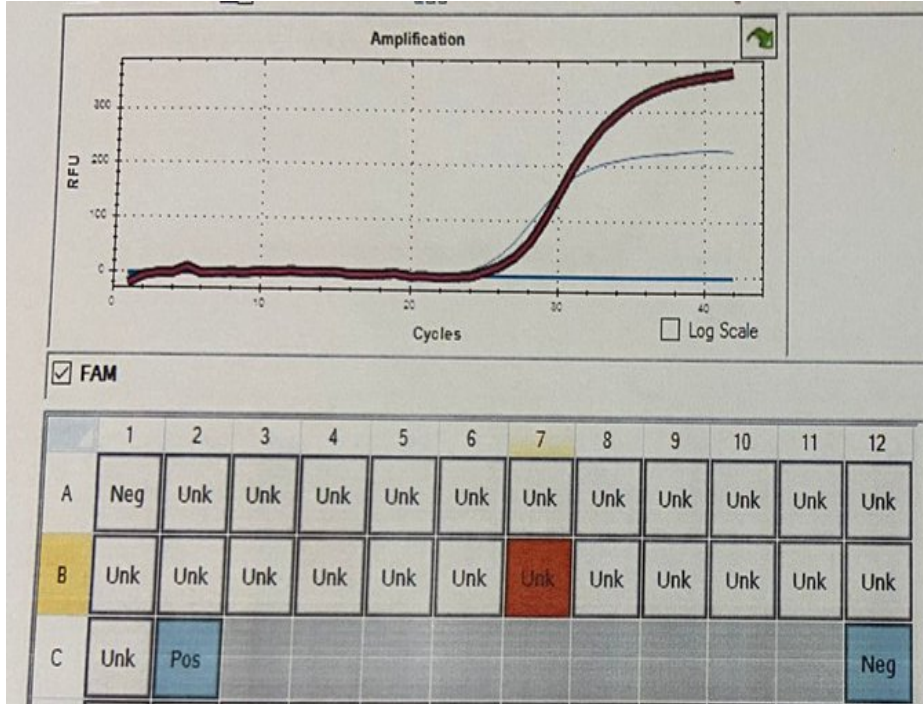
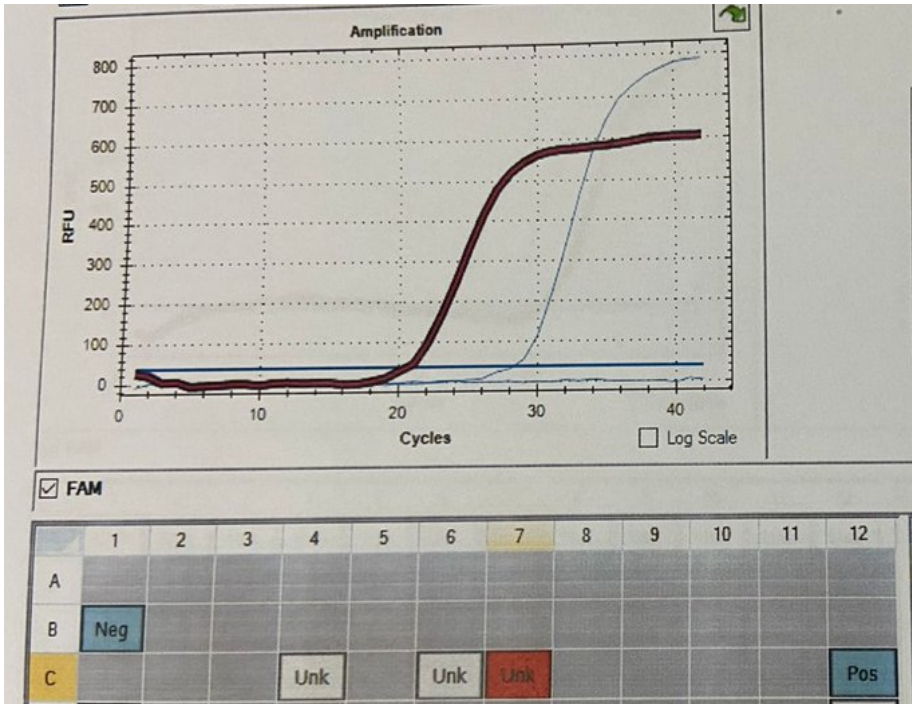
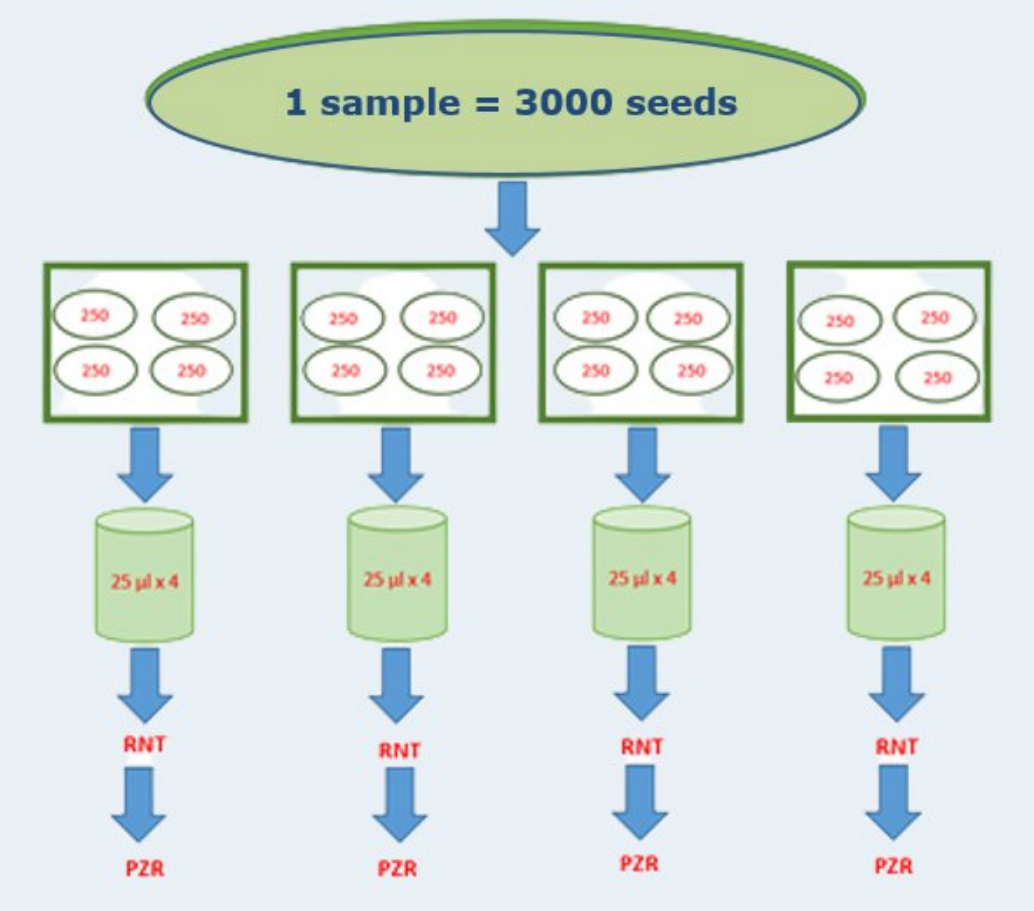


- **Since 2021 employed at the Central Phytosanitary Laboratory of the Azerbaijan Food Safety Institute**
- **Molecular biologist in the diagnostic laboratory**
- **Molecular diagnostics to detect and identify plant pathogens – mostly viruses - in plants, seeds & seedlings, fruits and other consignments for import/export inspection**
- **Sampling, nucleic acid extraction, qPCR (RT)**

<https://dc.eppo.int/laboratory/viewlab?idlab=185>

The Starting Point of My Research

- In 2022-2023, during import inspections, TSWV was detected in several seed lots of pepper and tomato
- Sample preparation according to ISF standards
- Positive results obtained by RT-qPCR
- The question was, “Is this real seed transmission or contaminated seeds?”

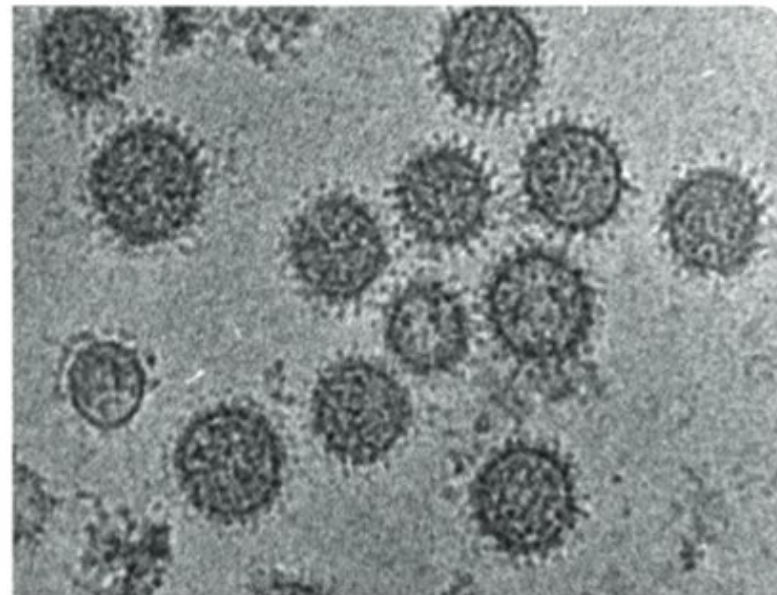
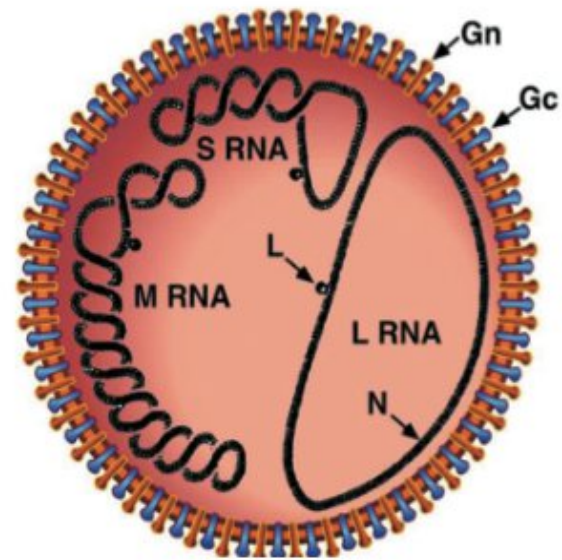


Tomato Spotted Wilt Virus (TSWV)

Family: Tospoviridae

Genus: Orthotospovirus

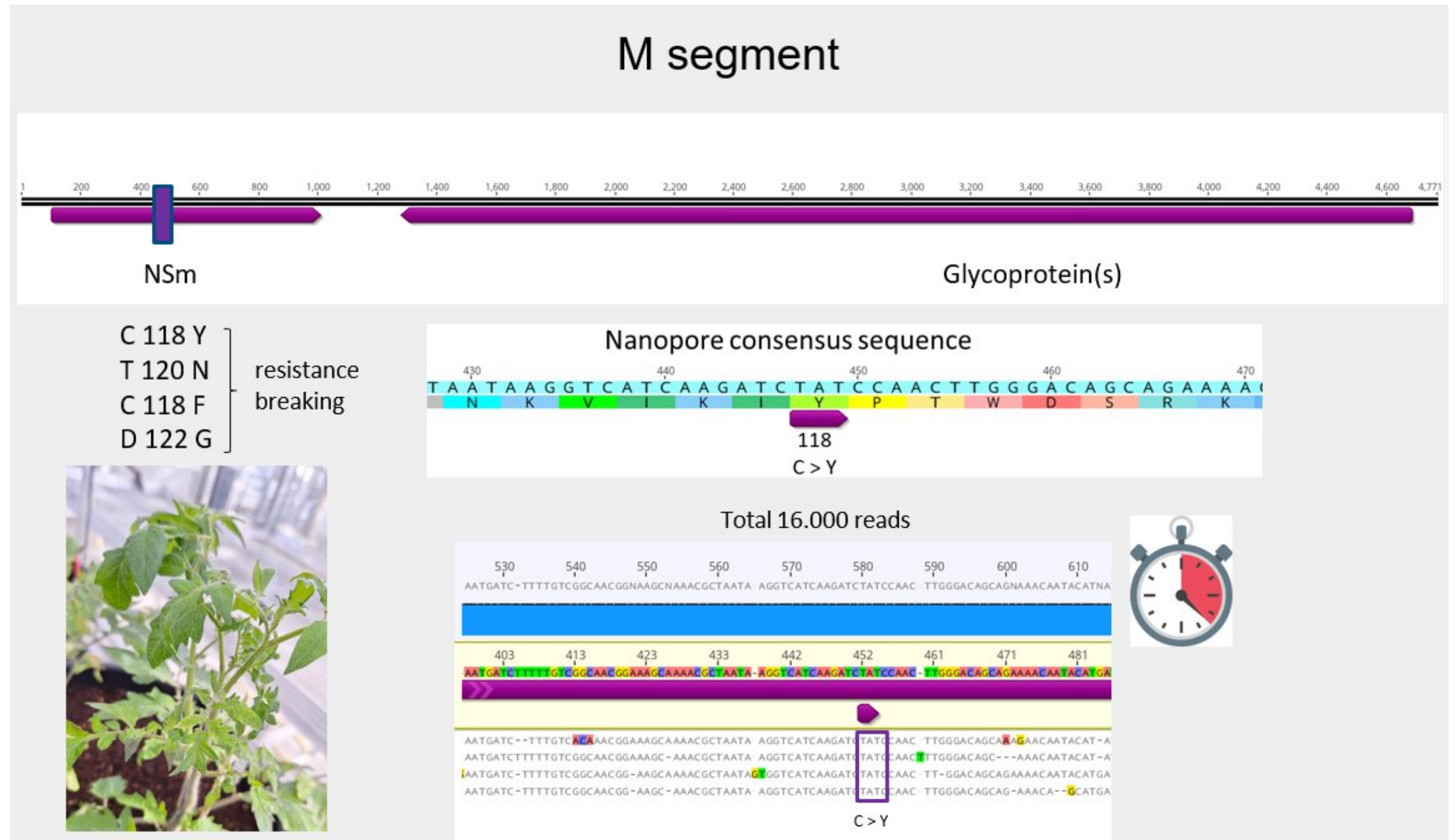
Species: Tomato spotted wilt virus



My Initial Work

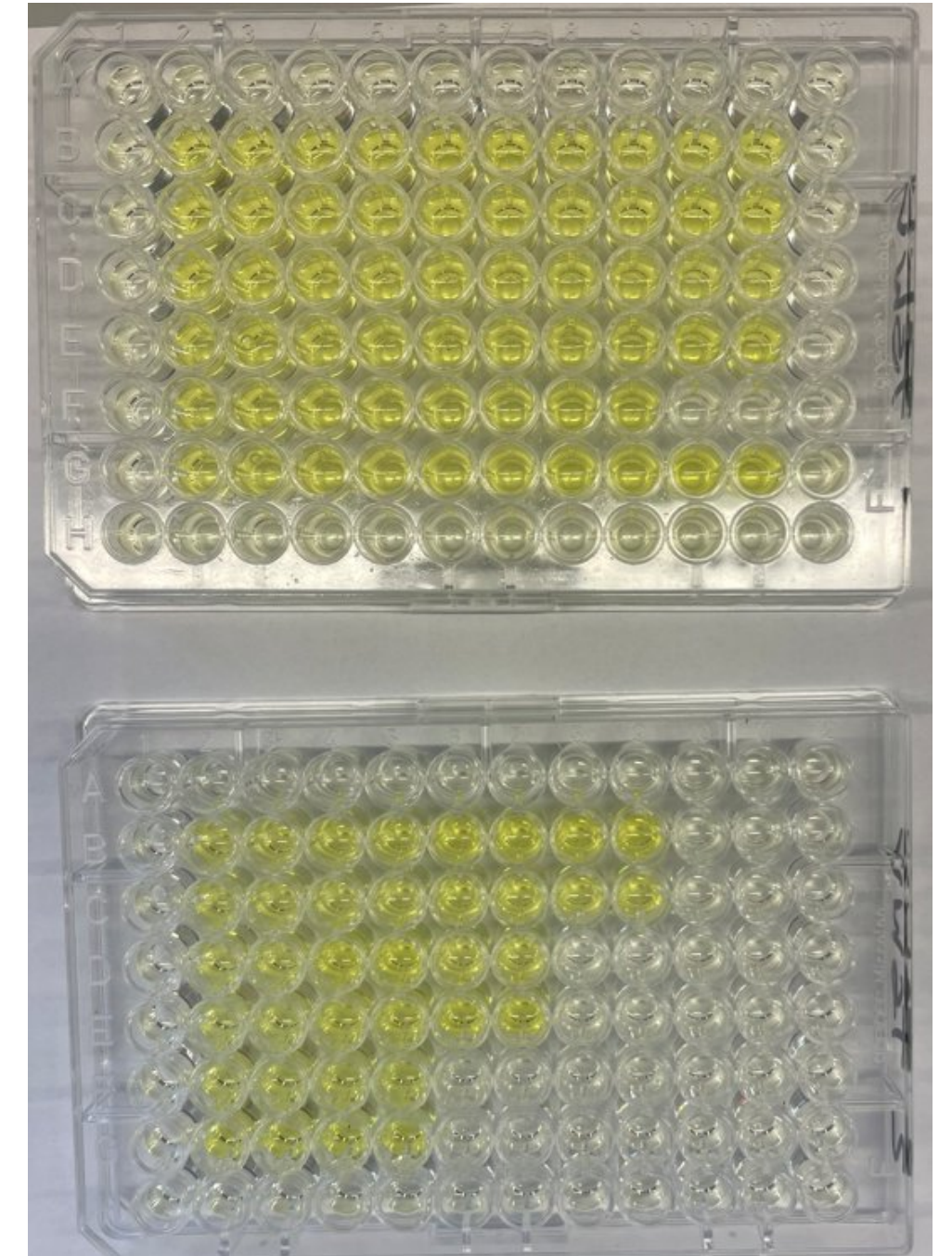
Further investigated at the Plant Virus Department of the Leibniz Institute DSMZ for in-depth research project

- Verify PCR findings – sequencing
- Reconstructed the complete genome – Resistance breaking isolate of TSWV
- Mutation in NSm and acts on Tomato resistance gene SW5



Mechanical inoculation

- Bio-assays on *Solanum lycopersicum*, *Capsicum annuum* and *Nicotiana tabacum*
- Tomato and pepper genotypes with known SW5 resistance
- Used resistance breaking isolate and a DSMZ PV-1175 (wild-type isolate)
- ELISA and RT-PCR for detection of TSWV in leaves and seeds of tomato and pepper



Mechanical inoculation with PV-1413 (resistance breaking isolate)

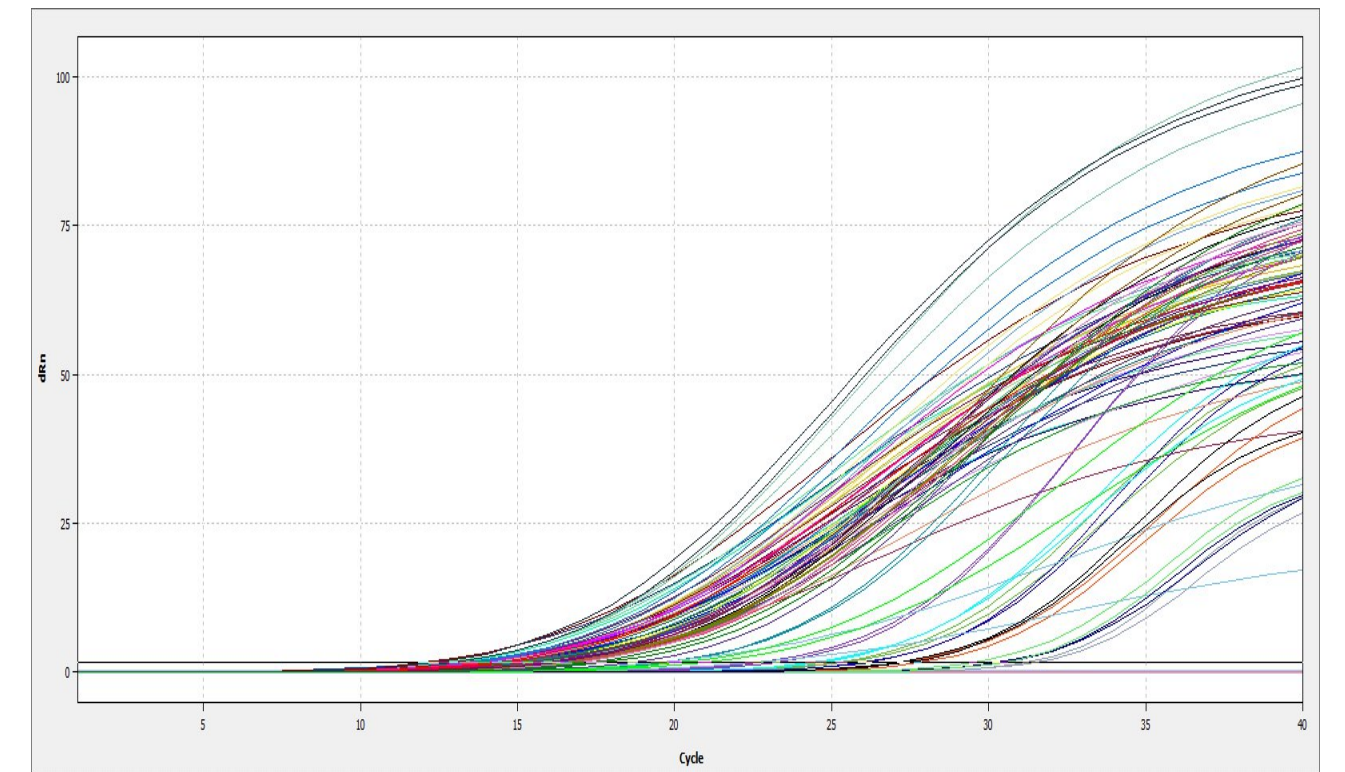
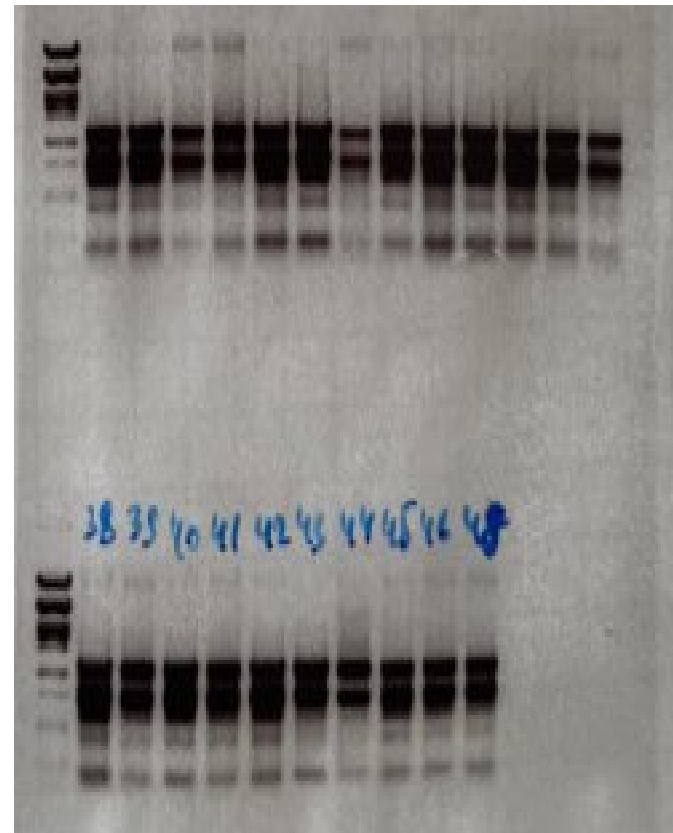


10 resistant tomato plants after 14 days of inoculation by PV-1413



Grafting for tomato plants

			plants
Graft union: Resistant plant	→	Rootstock: TSWV (PV 1175)	6
Graft union: TSWV (PV 1175)	→	Rootstock: Healthy plant	3
Graft union: TSWV (PV 1175)	→	Rootstock: Resistant plant	13
Graft union: Resistance breaking isolate	→	Rootstock: Healthy plant	3
Graft union: Resistance breaking isolate	→	Rootstock: Resistant plant	17



Result - Symptoms on Tomato



Fruit symptoms as characteristic blotches of the susceptible tomato variety Linda from plants infected with the wild-type TSWV isolate PV-1175

Fruit symptoms of susceptible tomato variety Linda from plants infected with the resistance-breaking TSWV isolate PV-1413



Fruit symptoms of the TSWV resistance breaking isolate PV-1413 on the SW5 resistant tomato variety Torry.

Result - Symptoms on Pepper



Symptoms of TSWV on leaves of susceptible pepper varieties 11 days after inoculation

Symptoms of TSWV isolate PV-1175 on pepper fruits consist of necrosis, fruit deformation, discoloration and necrotic ring patterns.



Hypersensitivity reaction in pepper leaves inoculated with the wild-type TSWV isolate PV-1175.

Results

- Resistance-breaking and wild-type TSWV isolates infected tomatoes with the resistance-breaking isolate producing particularly strong reactions with severe symptoms on leaves and fruits of susceptible tomato varieties.
- Infections of Sw-5 resistant varieties gene, which is conferring resistance to such viral infections, was ineffective against this specific isolate.
- When the same resistance-breaking isolate was inoculated into pepper plants with TSWV resistance it was shown that pepper plants remained resistant and did not exhibit any signs of infection.
- This suggests that while the virus can overcome Sw-5 resistance in tomatoes, the resistance mechanism in peppers is different and robust to prevent virus infection.

In conclusion, these findings underscore the need for further research and repeated experimental trials.

One of the Main Achievement

- Established international collaboration
- Strengthened links between home institution and host organization
- Initiated long-term institutional partnership





THANKS to EPPPO!
THANKS to DSMZ!
THANKS FOR YOUR ATTENTION!