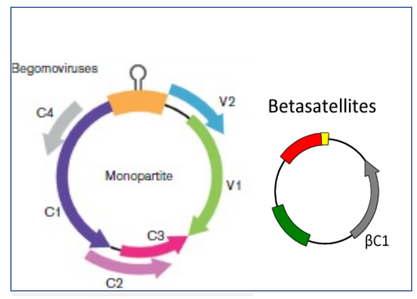
Role of within- and between-host selection on the evolution of a plant-virus satellite

Plant-virus satellites

- small circular DNA molecules
- depend on a virus for replication and encapsidation
- association between a satellite and a virus often increases virus symptoms
- some plant viruses need to be associated with a satellite for infection



The CLCuGeB satellite and its associated viruses CLCuGeV and TYLCV

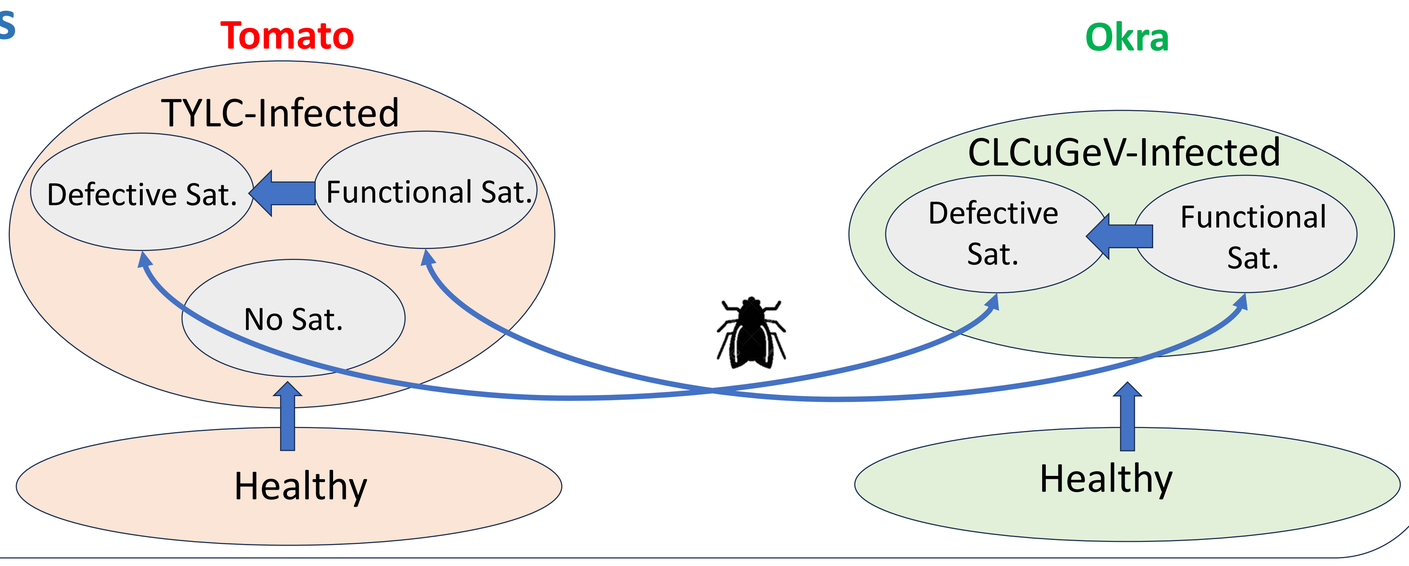
- Both CLCuGeV and TYLCV transmitted by the white fly *Bemisia tabaci*
- CLCuGeB (Cotton Leaf Curl Gezira Betasatellite) is necessary for infection of Malvaceous plants (okra, cotton) by CLCuGeV (Cotton Leaf Curl Virus)
- TYLC (Tomato Leaf Curl Virus) does not need CLCuGeB for infection of Solanacous (tomato) plants, but **the association with CLCuGeB increases TYLC symptoms**
- CLCuGeB not yet in the Mediterranean region
- **CLCuGeB is a major threat for tomato cultures in the Mediterranean region**

Tomato plant : healthy, virus infected, virus and satellite infected

Degenerative satellites and the scales of selection

- Degenerative viruses and satellites are naturally generated during infection
- Degenerative viruses and satellites are shorter and replicate faster ➡ favored at the within-host scale
- CLCuGeV needs fully functional satellites to infect new malvaceous hosts ➡ functional satellites favored at the between-host scale
- TYLC does not need the satellite to infect solanaceous hosts ➡ no selection on the satellite

Under what conditions could satellites be maintained in Malvaceous-Solanaceous agrosystems ?



Plan of investigation

- Modeling approach : compartment models
- Based on experiments performed in the host lab
- Mathematical and numerical analysis

Where, who

- **Plant Health Institute of Montpellier** : a research unit with expertise in plant diseases
- Baillarguet campus (close to Prades-le-Lez)
- Characterizing and modeling plant epidemics (**CAMEPI**) group

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Experimentation

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Modeling