Mechanisms of virus-vector interactions mediating disease transmission
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**Mechanisms of virus-vector interactions mediating disease transmission**

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**Do plant viruses perceive the presence of aphid vectors?**

**Model**

Aphid punctures trigger instant calcium elevations at the puncture site. They might be the first step in establishment of plant defense responses against these predators (see model above).

Many plant viruses are transmitted by aphids. There is evidence that viruses modify plant defenses, for example to modify interactions of plants with virus-transmitting aphids.

Such modifications could effect the very first steps in virus-aphid interactions (transmission).

Therefore, we tested whether virus infection interferes with local calcium elevations.

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**Experimental system**

**Analysis of calcium signal**

- Time lapse video
- Method:
  - Recording of aphid activity by bright field microscopy
  - Recording of calcium concentration by fluorescence ratiometry
  - Temporal-spatial analysis

**Results**

- Bimodal distribution for CaMV and TuMV, unimodal for TuYV and healthy

⇒ Viruses alter calcium signaling differently

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**Can a plant virus perceive the presence of a plant while being retained in its insect vector?**

**Model**

Viruses that retain in the foreguts of whitefly vectors must be released and inoculated into the plant in order to achieve transmission.

Many whitefly-transmitted viruses are emerging viral pathogens of important food and fiber plants.

Although whitefly feeding on plants contributes to the inoculation of foregut borne viruses, nothing is yet known about the role(s) that plants play, if at all, in virus inoculation.

Therefore, we conducted studies to test the hypothesis that the inoculation of a foregut borne virus can be mediated by a plant trigger.

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**Experimental system**

**Establish virus host (B. rapa) and non-host (B. napus)**

Plant-to-plant transmission of lettuce infectious yellow virus (LIYV) to B. rapa or B. napus

**Reverse transcription (RT) - PCR**

**Western Blot**

**Virus Retention Assays**

**Results**

¿ Viruses alter calcium signaling differently