

Video Article

Testing the Physiological Barriers to Viral Transmission in Aphids Using Microinjection

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Abstract

Potato loafroll virus (PLRV), from the family Luteoviridae infects solanaceous plants. It is transmitted by aphids, primarily, the green peach aphid. When an uninfected aphid feeds on an infected plant it contracts the virus through the plant phloem. Once ingested, the virus must pass from the insect gut to the hemolymph (the insect blood) and then must pass through the salivary gland, in order to be transmitted back to a new plant. An aphid may take up different viruses when munching on a plant, however only a small fraction will pass through the gut and salivary gland, the two main barriers for transmission to infect more plants. In the lab, we use physalis plants to study PLRV transmission. In this host, symptoms are characterized by stunting and interveinal chlorosis (yellowing of the leaves between the veins with the veins remaining green). The video that we present demonstrates a method for performing aphid microinjection on insects that do not vector PLRV viruses and tests whether the gut is preventing viral transmission. The video that we present demonstrates a method for performing Aphid microinjection on insects that do not vector PLRV viruses and tests whether the gut or salivary gland is preventing viral transmission.

Video Link

The video component of this article can be found at <https://www.jove.com/video/700/>

Protocol

1. To test if an aphid is able to vector a virus, we feed the aphids on infected tissue for 2 days.
2. Then, we allow it to feed in a healthy plant for 5 days. The plant is then fumigated and after 3 weeks we start searching for symptoms.
3. When we find an aphid that cannot vector a virus, we can assess which of the 2 barriers is stopping the virus using a microinjection procedure.
4. The virus is injected directly into the hemocoel, thereby bypassing the gut transmission barrier.

Please visit [Annual Reviews of Plant Biology](#) for more information about this protocol and plant immunity to insect herbivory.

Disclosures

The authors have nothing to disclose.