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Communication

Hitching a Ride: Examining the Ability of a Specialist Baculovirus to Translocate through Its Insect Host's Food Plant

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cut (cut leaves). For the former, we drenched the soil of maize plants with a suspension of the virus in water, and for the latter, we placed leaf cuttings in the same viral water suspension. In addition, this combination of treatments allowed us to determine whether the virus could be translocated via the roots to the leaf tissue or if the virus was able to be translocated via the petiole of the leaf.

2. Results

The percentage of infected fall armyworms was unaffected when neonates were fed plants or leaves drenched in the virus water suspension (Table 1). In contrast, the positive control was able to induce an 86% infection rate (Table 1 and Figure 1), whereas no infections occurred in the negative controls.

Table 1. GLMM parameter estimates for the effect of each treatment on the probability of *S. frugiperda* virus-induced mortality. The intercept corresponds to the positive control where the foliage was dipped in a virus water suspension. The three other terms correspond to when larvae were fed on untreated plants (i.e., negative control), plant soil was drenched in a virus water suspension (i.e., drenched plant) and leaves were drenched in a virus water suspension (i.e., drenched leaf). All virus water suspensions had the same concentration.

Term	Estimate	Standard Error	Z Value	Pr (>|z|)
Intercept	1.447	0.556	2.604	0.009
Negative Control	39.320	1.036 10^7	0.000	1.000
Drenched Plant	38.690	8.523 10^6	0.000	1.000
Drenched Leaf	46.370	9.789 10^6	0.000	1.000

Figure 1. Application method of baculovirus on fall armyworm virus-induced mortality (standard error). Bars show the percent of fall armyworms that were infected when the baculovirus application varied. All virus water suspensions had the same concentration.

Furthermore, our molecular analysis confirmed the presence/absence of viral DNA according to the baculovirus application method. The presence of viral DNA was detected solely in the positive control treatment, while viral DNA was not detected in the negative control, drenched plant, or drenched leaf treatments (Figure 2). Taken together, our results do not support the possibility of the uptake and translocation of SfMNPV within the plant.

release fertilizer (The Scotts Miracle-Gro Company, Marysville, OH, USA). Plants were grown for a total of 15 days before being used in the subsequent experiment.

We used a commercially available SfMNPV, Fawligen (strain number MNPV-3AP2, lot number S190405; AgBiTech; Fort Worth, TX, USA), for all experiments; ~33% of the product contains OBs, with the rest being made up of a water/glycerol mixture. The commercial preparation was diluted to 1.5 10^4 OBs/μL—the label recommendation for the concentration in foliar field applications on *Z. mays*. We randomly selected maize plants, covered their base in plastic wrap to prevent splashing, and watered them from the top of the soil surface with 200 mL of the viral water suspension daily for four days before the start of the subsequent mortality bioassay. This amount is the equivalent of ~100 infected 4th instar larvae per day. These plants comprised our drenched soil whole plant treatment. Our second treatment consisted of the cut leaf group to test the ability of the baculovirus to enter via the petiole. We randomly selected plants, cut 2.5 cm above their base in the soil, and placed the leaves in a 10 cm floral water pick/tube (Oasis Floral Products, Kent, OH, USA) that contained 15 mL of the virus water suspension. These leaves were placed in a 28 C incubator, and their virus water suspension was replaced daily for two days before use in the subsequent mortality bioassay.

Neonate Mortality Bioassay: Viral translocation was tested using a mortality bioassay. Plant foliage (enough whole plant leaves for larvae to feed ad libitum) from each treatment (n = 12 per treatment; controlled for plant size) was placed in closed 100 15 mm petri dishes containing filter paper discs, saturated with water daily to prevent the leaf tissue from drying out, during the experiment. As a positive control, foliage was taken from the control plants and dipped into a 1.5

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