

Preference and performance of western flower thrips

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Abstract: Differences in performance on, and preference for, different plant parts were studied on cucumber plants. On these plants thrips are often most abundant on the youngest plant parts. This suggests that the youngest leaves are most suitable for western flower thrips. We assessed if differences in suitability of leaves of different age could explain the distribution of thrips on cucumber plants. Evidence was obtained for a correlation between preference and performance on cucumber leaves of different age. Differences in performance on, and preference for, different host plant species were studied with selected isofemale lines. Thrips from these isofemale lines showed differences in performance on different host plant species. It was assessed whether these differences in performance were correlated with differences in preference. No clear evidence was obtained for correlations between preference and performance on different host plant species.

Introduction

A correlation between performance on, and preference for, specific host plants or plant parts by herbivorous insects seems adaptive. One would expect a preference by the insect for those plants or plant parts that are most suitable for the insect in terms of fitness (e.g. reproduction, survival). However, other factors may also affect insect preference for certain plants or plant parts, such as avoidance of predators or competition.

Materials & Methods

Western flower thrips, *Frankliniella occidentalis*, was reared on flowering cucumber plants "Autumn Green" in a greenhouse (de Kogel et al., 1997). Isofemale lines were created by crossing a virgin female with one of her sons, as described by De Kogel (1997).

Cucumber leaf age experiment

In the middle of a petri dish, 2 leaf discs ($\varnothing = 2.5$ cm) were put adaxial side down, side by side on moist tissue paper. Apical, middle and basal leaves from 6 weeks old cucumber plants were used in all possible combinations ($n=5$). Ten adult females were released in each petri dish and removed after 28 h. After 4 days the numbers of larvae that had hatched from each

separate leaf disc was recorded (for details on experimentation see De Kogel et al., 1997).

Host plant experiment

As measure of performance, reproduction of isofemale lines NL2.E and JAP.E was determined on leaf discs of bean and cucumber, and reproduction of isofemale lines NL2.C and NL2.D was determined on leaf discs of bean and pepper. These sets of isofemale lines and host plants were chosen because there were distinct differences in performance on the different hosts (figure 2 and 3). In dual-choice assays, thrips were offered a choice between leaf discs from the different hosts, and at 2, 4, 22 and 24 h after the start of the choice experiment the numbers of thrips per leaf disc were recorded (for experimental details see De Kogel, 1997).

Results & Discussion

Thrips females clearly achieved a higher rate of reproduction on young (apical) cucumber leaves than on older leaves (figure 1). In choice situations thrips preferred to lay eggs in the younger leaf discs in all cases (figure 1). It is concluded that, in cucumber, thrips prefer those leaves on which

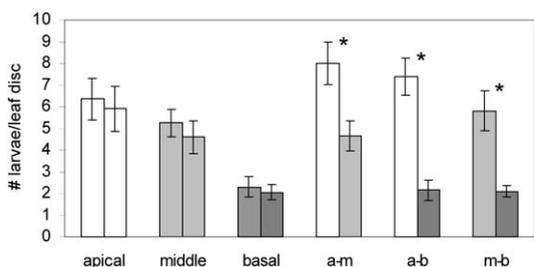


Figure 1. Oviposition of *Frankliniella occidentalis* on leaf discs from cucumber leaves from different position relative to the plant apex. Left three sets of bars: two leaf discs from the same position (no choice); right three sets of bars: choice between leaf discs from leaves from different positions. a=apical leaf, m=middle leaf, b=basal leaf. * indicates significant difference, P<0.05.

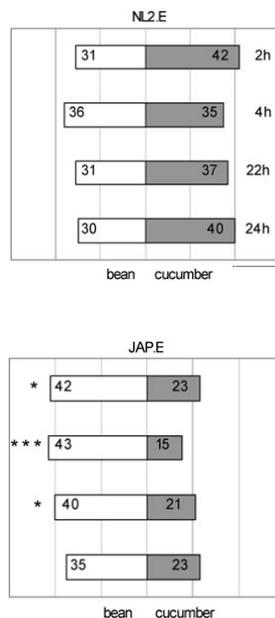
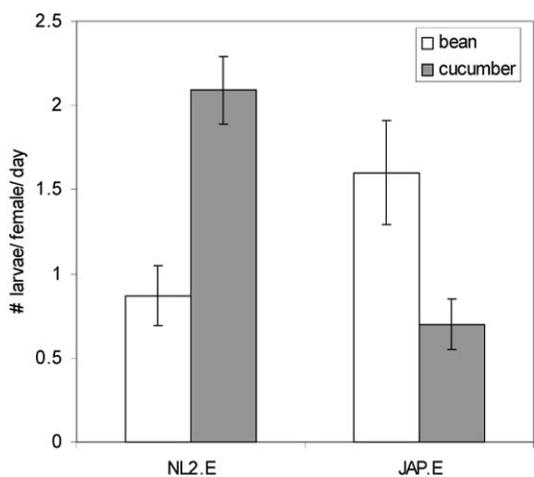


Figure 2. Large chart: reproduction of *Frankliniella occidentalis* from isofemale lines NL2.E and JAP.E on leaf discs from bean and cucumber. Small charts: number of thrips females on leaf discs of bean and cucumber in choice assays after 2, 4, 22 and 24 h. *P<0.05, **P<0.01, ***P<0.001.

they achieve the highest reproduction. These are the youngest leaves. This is consistent with observations on thrips distribution on cucumber plants: most thrips are found on the youngest leaves.

There was a clear difference in performance on leaf discs of bean and cucumber between thrips from isofemale lines NL2.E and JAP.E (figure 2). If these differences were correlated with

differences in preference it would be expected that thrips from NL2.E would prefer cucumber over bean, and thrips from JAP.E would prefer bean over cucumber. In choice assays there was some indication for such a correlation: thrips from JAP.E clearly preferred bean over cucumber, and slightly more thrips from NL.E were found on cucumber than on bean leaf discs (no significant difference).

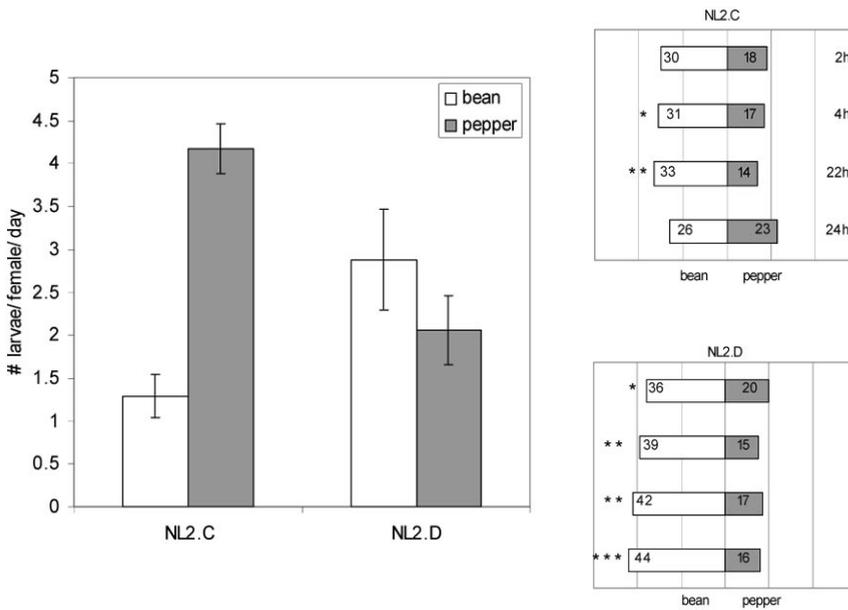


Figure 3. Large chart: reproduction of *Frankliniella occidentalis* from isofemale lines NL2.C and NL2.D on leaf discs from bean and pepper. Small charts: number of thrips females on leaf discs of bean and pepper plants in choice assays after 2, 4, 22 and 24 h. *P<0.05, **P<0.01, ***P<0.001.

For isofemale lines NL2.C (higher reproduction on pepper than on bean) and NL2.D (higher reproduction on bean than on pepper) there was no indication for a correlation between preference and performance (figure 3). Thrips from both isofemale lines preferred bean over pepper. Thus, based on this limited dataset, no general conclusions can be drawn concerning preference-performance correlations on different host plant species.

References

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