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LYGUS LINEOLARIS: A PEST PREYING ON OTHER PESTS

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L2 TPB feeding on an aphid.

The zoophagous behavior of true omnivorous is often overlooked when these species are also important pests. Understanding functional and numerical responses of the predator component of omnivorous pests is important from an eco-systemic perspective and for biological control purposes. ***Lygus lineolaris* (TPB)** attacks more than 130 plant species, among them strawberries, and has become an important neartic pest.

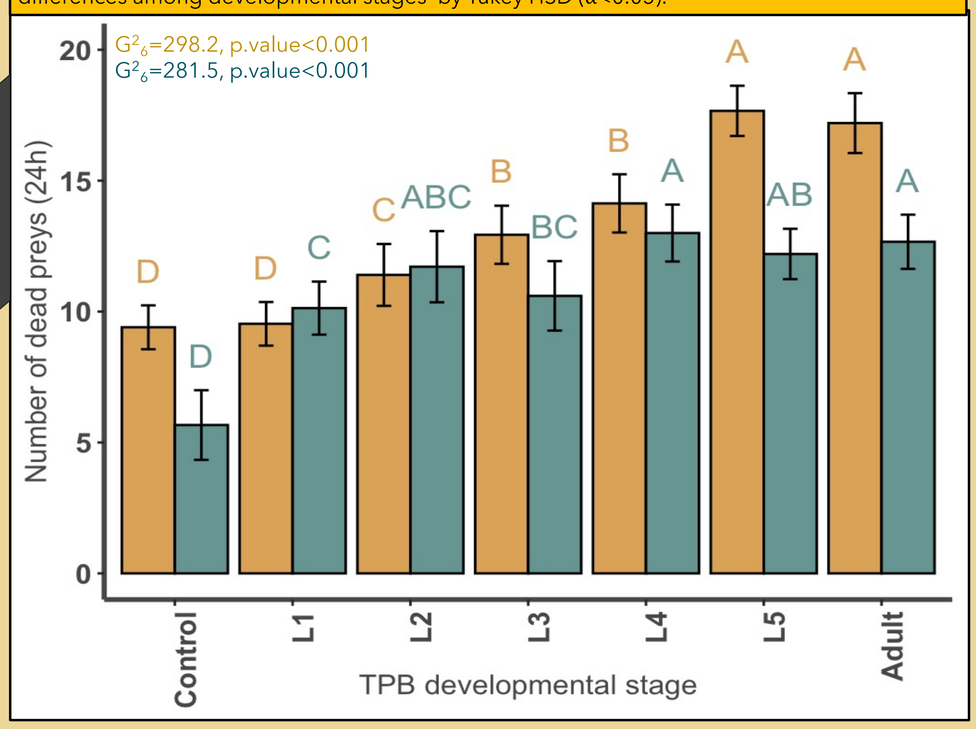
The aim of this study was to highlight the predator behavior of TPB by assessing: **i)** it's functional response, **ii)** it's voracity across different developmental stages and**, iii)** it's fitness (survival curves & number of days two adulthood) when preying on two other strawberry pests: ***Myzus persicae*** and ***Tetranychus urticae*.**

To assess the **voracity** and **functional response**, fastened TPB were allowed to feed for 24h on a different density of preys (aphids or spider mites) in small arenas and the number of dead individuals were assessed.

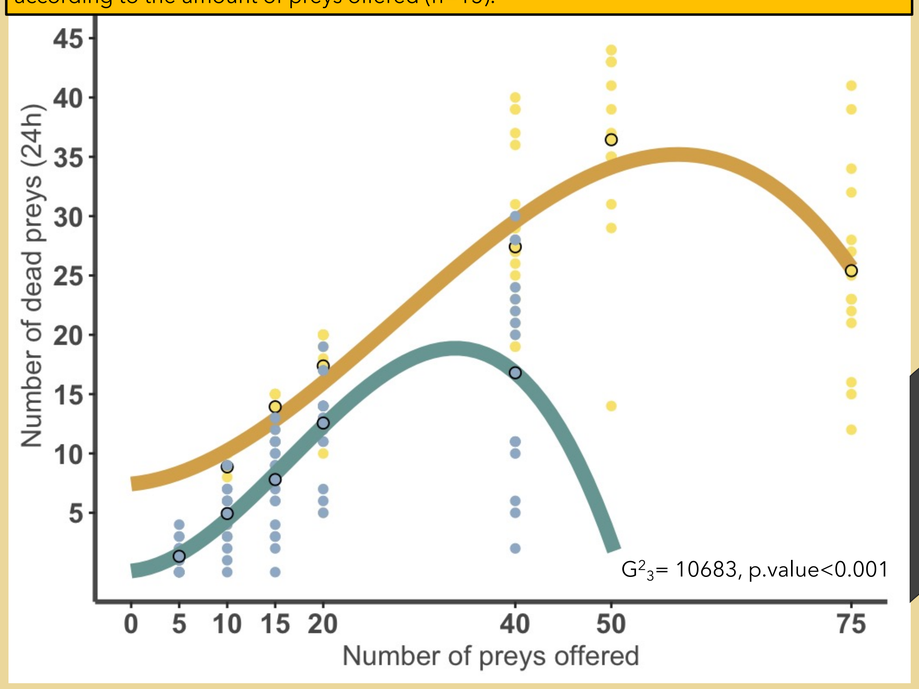
- TPB is a highly voracious predator of aphids and spider mites.
- For both species, TPB prey feeding increases with age.
- Prey consumption was higher on aphids than on spider mites, especially for older TPB developmental stages (t=1.99, df=28, p.value<0.05).
- TPB adults consumed 17±1.1 aphids while 13±1 spider mites.

Voracity across TPB developmental stages

Mean number (± std. error) of aphids or spider mites consumed in 24h per each TPB developmental stage when 20 preys were offered (n=15). Letters above bars denote mean differences among developmental stages by Tukey HSD (α<0.05).



Polinomial logistic regressions of the number of consumed preys by adult TPB (24h) according to the amount of preys offered (n=15).



Functional response of TPB

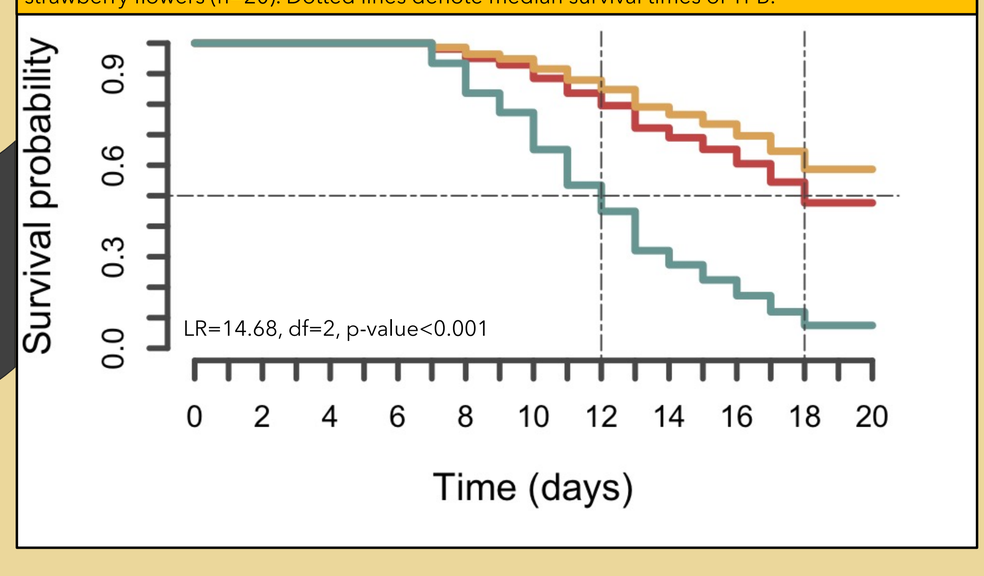
- TPB follows a functional response curve of type III typical of generalist predators. Hence, TPB may switch its prey preferences according to prey abundance, handling time or foraging cost.
- TPB satiates earlier when feeding on spider mites than on aphids. Yet, the maximal prey consumption was 35 individuals when 50 aphids were offered while 20 preys when 40 spider mites were offered.

To assess **TPB fitness**, both preys were offered from TPB N2 stage until adulthood and the survival curves and nymphal development time were evaluated.

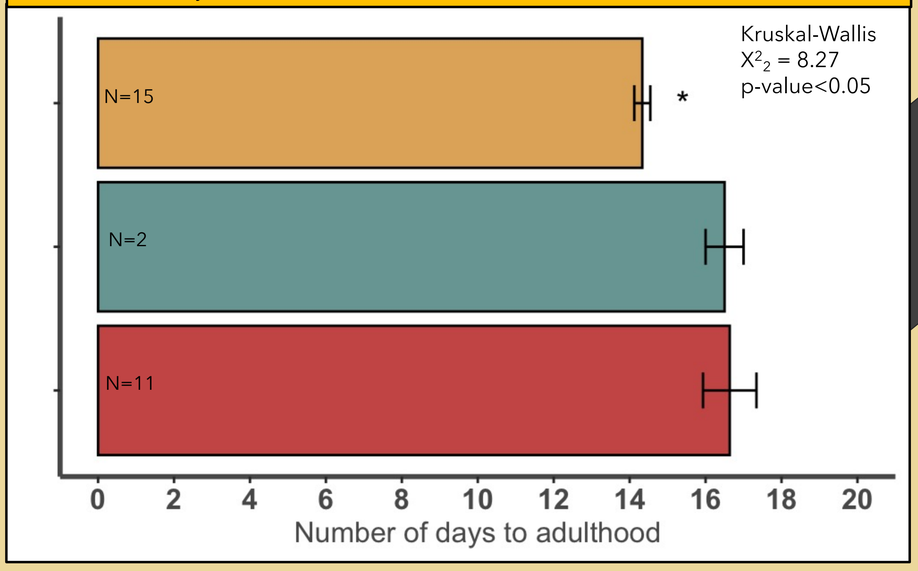
- The assessed diets significantly affected the survival curves of TPB.
- Feeding on spider mites significantly reduced the nymph's survival on 96% (hazard ratio=3.49±0.02, p<0.005) while feeding on aphids or strawberries increased it.
- Median survival time of TPB was 12 days when feeding on spider mites, 18 days when feeding on strawberries and was superior to 20 days when feeding on aphids.

Survival curves

Cox survival curves of TPB across time (days) when feeding on aphids, spider mites or strawberry flowers (n=20). Dotted lines denote median survival times of TPB.



Mean number of days (± std. error) required to TPB adulthood when feeding on aphids, spider mites or strawberry flowers. Asterisk denote statistical differences in Wilcox test with Bonferroni adjustment method (α =0.05).



Number of days to adulthood

- TPB diet significantly affected the number of days required to adulthood.
- Feeding on aphids reduced in 16% the time required to adulthood compared to feeding on strawberry flowers.
- Only 2 TPB fed on spider mites arrived to adulthood and these required similar developmental time than when feeding on strawberry flowers (~16 days).

Legend

Aphids: *Myzus persicae* **Spider mites:** *Tetranychus urticae* **Strawberry flower:** *Fragaria ananassa*

Our results have shown that *L. lineolaris* asides from being an important pest can also act as a highly voracious generalist predator. Hence, TPB may also play a role as a biological control agent on other important strawberry pests such as aphids or spider mites. Additionally, TPB fitness is reduced when feeding on spider mites and increased when feeding on aphids. Yet, TPB damage on strawberries can fluctuate according to other ecosystemic players.

Overall, learning the feeding requirements of phyto-zoophagous species, especially when these are key pests, may facilitate the understanding of their behavior and contribute to the knowledge of its trophic connections for optimal IPM strategies.

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