SPIDERS AS POTENCIAL PREDATORS OF TRUE BUGS USED IN BIOLOGICAL CONTROL

Kateřina ČERŇANSKÁ[1], Jan RAŠKA[2]

Department of Plant Protection, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 00, Prague 6 – Suchdol, Czech Republic

INTRODUCTION

Some true bugs (*Hemiptera: Heteroptera*), such as minute pirate bugs (*Anthocoridae*) and plant bugs (*Miridae*), can be used for biological pest control, primarily against aphids and thrips. However, many of these bugs are relatively small in size and appear to lack defence mechanisms found in other taxa of true bugs, such as thick cuticle or powerful chemical defences. They may therefore represent common prey for generalist predators such as spiders in intra-guild predation (IGP). We tested this hypothesis by using representatives of several major spider families as model predators and common representatives of bugs taking part in biological pest control.

PREDATORS AND PREY

Evarcha arcuata (*Salticidae*)
- small to medium-sized spider
- vegetation-dwelling, on herbaceous plants

Pardosa sp. (*Lycosidae*)
- medium-sized to large spider
- epigeic predators, common in agroecosystems

Philodromus sp. (*Philodromidae*)
- small to medium-sized spider
- vegetation-dwelling, common in orchards, forests and other arboreal vegetation

Orius laevigatus (*Anthocoridae*)
- small predator of thrips, mites, aphids etc.
- comercially available

Macrolophus pygmaeus (*Miridae*)
- medium-sized predator of aphids, moth eggs/larvae etc.
- comercially available

Deraeocoris ruber (*Miridae*)
- large predator of caterpillars, aphids etc.
- common in European agroecosystems

METHODS

Experimental Animals:
- wild-caught spiders, fed fruit flies every 3-4 days (≥3 times)
- one feeding skipped before each trial
- true bugs: purchased (OL, MP) or wild-caught (DR), fed peach aphids

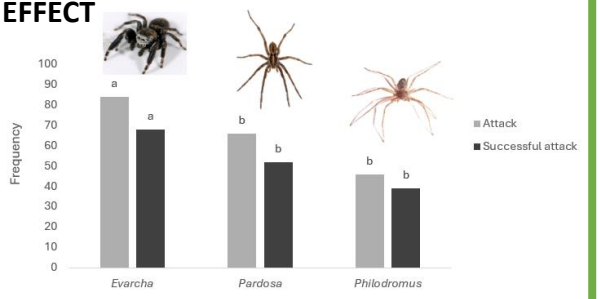
Experimental Design:
- spiders exposed to a single prey in a Petri dish for 10 minutes
- up to 4 trials: 3 true bugs + 1 control (*Drosophila melanogaster*)
- 1-week interval between trials

Data Analysis:
- GEE-b (geepack package)
- dependent variables: attack occurrence, successful attack
- explanatory variables: prey/predator size ratio (log-transformed), age of spiders, spider taxon, prey species
- ***Deraeocoris*** was included in statistical analysis to assess the effect of prey species on attack frequency but was excluded from the analysis of successful attacks, as **no successful attacks** were recorded on this species
- effect of other factors (size ratio, age, spider species) analysed with *Deraeocoris* but without prey species as a factor
- treatment contrasts used to compare individual factor levels

RESULTS

SPIDER TAXON – SIGNIFICANT EFFECT

- spiders difered in frequencies of attacks ($p < 0.001$) and successful attacks ($p = 0.004$)
- *Evarcha* attacked the most often compared to the other two species

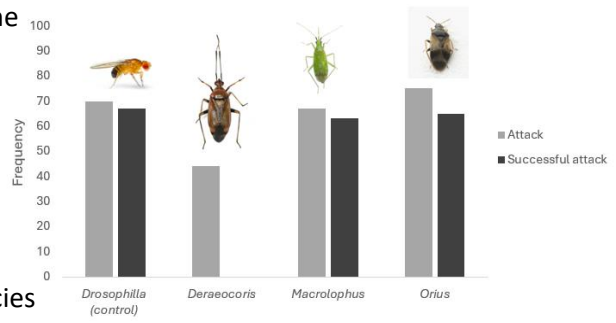


SPIDER AGE – NO SIGNIFICANT EFFECT

- juveniles did not differ significantly from adults ($p=0,179$), making it unlikely that age influenced their likelihood of attacking prey

PREY SPECIES – NO SIGNIFICANT EFFECT, BUT...

- all prey species, including the control, were attacked at similar rates ($p = 0.576$)
- no successful attacks on *Deraeocoris* (excluded from analysis)
- other prey species (incl. control) were successfully attacked at similar frequencies ($p = 0.929$)



CONCLUSION

All tested species of true bugs were highly attractive prey for all three spider taxa. While *Deraeocoris* was likely protected due to its relatively large size, the other species lacked effective defensive mechanisms against predators. As a result, they were particularly vulnerable to attacks. The high predation activity of *Evarcha arcuata* (and possibly other jumping spiders) may serve as both an advantage and a drawback in pest control. On one hand, it contributes to reducing pest populations, but on the other, it increases the risk of intraguild predation (IGP), which could disrupt predator communities.

This study was supported by TACR grant FW04020104: Increasing the profitability of sugar beet cultivation in the context of the increased incidence of virus yellows and the sustainable reduction of pesticides in the EU

Contact: Kateřina Čerňanská
kackacernanska@seznam.cz