

Diversity and management of aphid hyperparasitoids in sweet pepper greenhouses in Belgium

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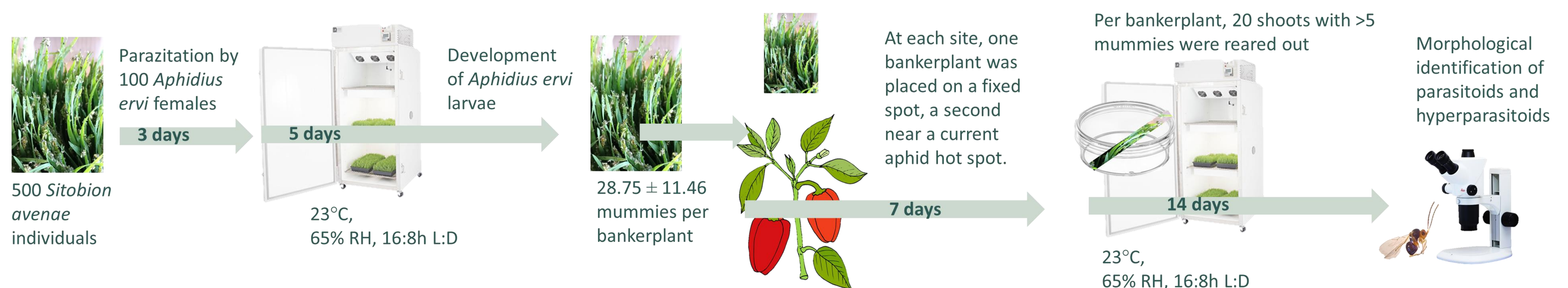
Introduction

Recently, green peach aphid (*Myzus persicae*) outbreaks have increased dramatically in sweet pepper production in Flanders. Inundative biological control with parasitoid wasps is a standard practice, however in the light of this recent difficulties to manage *M. persicae* all aspects of the current integrated control strategy should be subject to optimization. Reducing the impact of hyperparasitoids would be a novel approach to improve the aphid control by parasitoids. However, at present little is known about the hyperparasitoids in sweet pepper and so far, no effective control strategy exists. Therefore, we investigated the diversity and temporal dynamics of hyperparasitoids in the 2022 cropping season. Furthermore, we aimed to develop a lure that is attractive for the most abundant hyperparasitoid species and yet does not attract key parasitoid species.

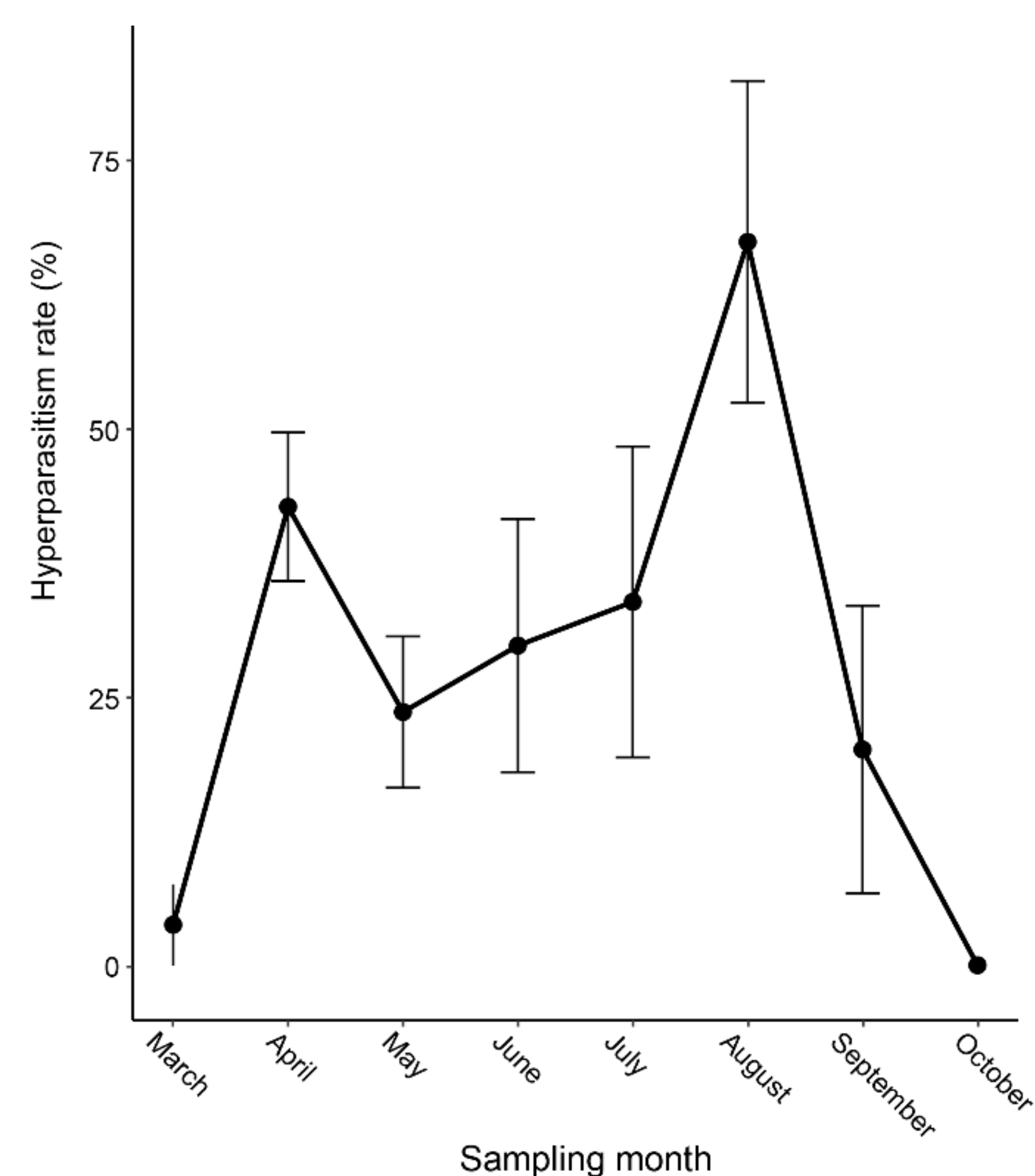
Materials and Methods

Hyperparasitoid populations were monthly sampled at five locations, from March till October 2022.

Sampling was done with wheat bankerplants (Ervibank, Koppert) with wheat aphids parasitized by *Aphidius ervi*.

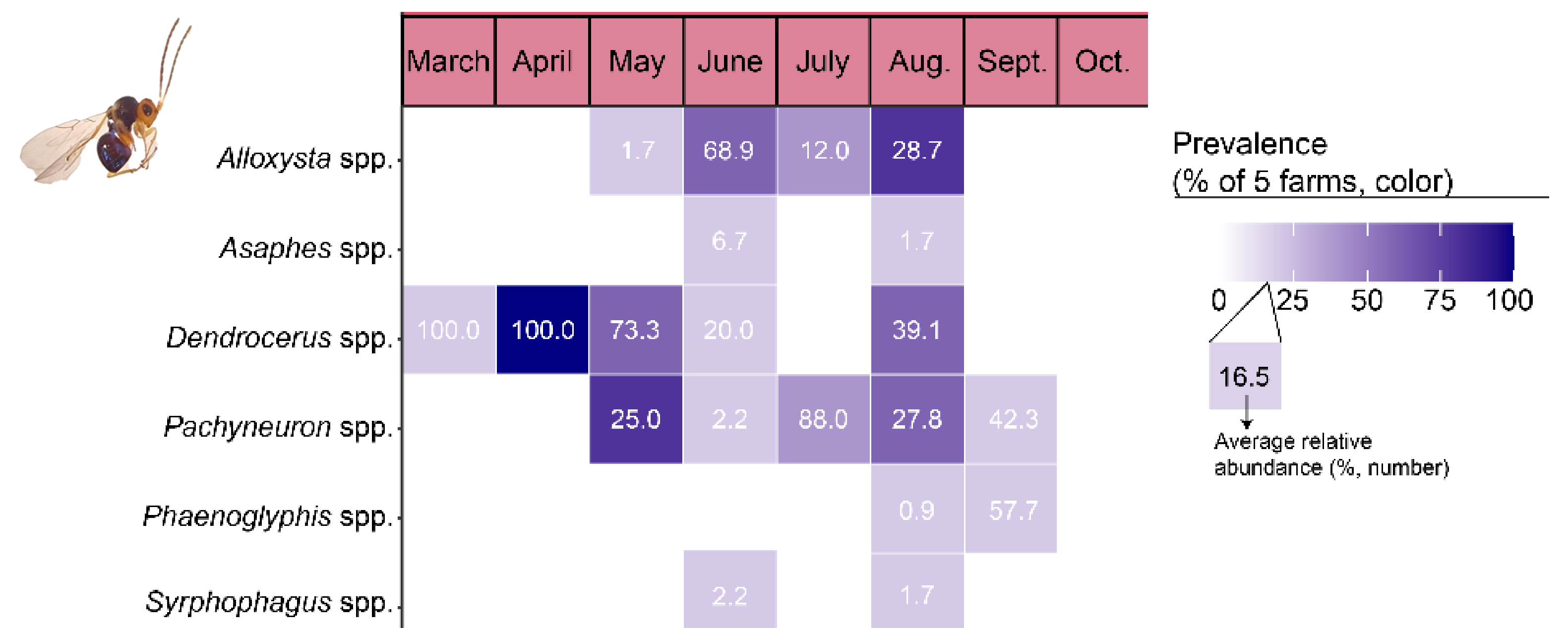


Results



The mean hyperparasitism rate showed two clear peaks. The first peak in these heated greenhouses occurred already in April with a mean rate of 42.52% (SEM = 7.31). The second peak occurs in August, when a mean rate of 67.08% (SEM = 14.91) was observed.

Six different genera were identified. The composition of the hyperparasitoid community showed to be strongly shifting over the growing season.



Dendrocerus clearly was the most abundant genus in March-April-May and was found at each location in April. In June *Alloxysta* became dominant, in July this was *Pachyneuron*. In August, *Dendrocerus* was again most abundant yet *Alloxysta* was more prevalent. In September yet another genus (i.e. *Phaenoglyphis*) was dominant. In October no hyperparasitism was observed.

Conclusions

- **Hyperparasitoids** already occur as early as **March** in heated sweet pepper greenhouses in Belgium and hyperparasitism rates remain **noteworthy until September**.
- **Six genera**, commonly described in other crops and regions, are present in *Capsicum annuum*, the **composition** of the community is **strongly dependent on the seasonal timing and location**.
- The observed **hyperparasitism rates above 20%** during the most **important period for aphid control** is known to significantly disrupt biological control.
- **Hyperparasitoids** thus are a **valid target** in the integrated aphid control, yet the here uncovered population dynamics and diversity are **challenging**.

Ongoing research and future perspectives

- Microbial volatile compounds identified as attractive for key hyperparasitoids while repellent for key parasitoids (van Neerbos et al. 2023).
- Field trials showed no significant attraction of single compound (linalool) lures for hyperparasitoids.
- Olfactory bioassays show indications of synergism in mixtures of attractive compounds linalool and acetic acid.
- Lure optimization and screenings for repellents are needed in the development of push-pull strategies.
- The potential of trap plants (removing bankerplants before emergence) could be investigated.

