

Poster 5: Parasitoids of *Drosophila* in Switzerland and Their Potential for Biological Control of the Invasive *Drosophila suzukii*

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The spotted wing drosophila, *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae), is native to Asia and has recently achieved an almost worldwide invasion (Asplen *et al.*, 2015). It lays its eggs into ripening undamaged fruits thereby causing large economic damage in stone fruit, berry, and vine cultivation (Mazzi *et al.*, 2017). Control of *D. suzukii* remains challenging, as numerous overlapping generations are present infesting crop and non-crop fruits in various habitats. Hymenopteran parasitoids could be an element of a sustainable control strategy and have therefore received increased attention recently (Gabarra *et al.*, 2015; Miller *et al.*, 2015; Rossi Stacconi *et al.*, 2015; Mazzetto *et al.*, 2016).

We conducted a field survey in four regions of Switzerland to assess the presence of *Drosophila* parasitoids (Knoll *et al.*, 2017). Fruits infested with sentinel *Drosophila melanogaster* Meigen hosts were deployed in each of six fruit orchards and six semi-natural habitats (forest-patches or hedgerows) early, middle and late during the fruit-growing season. After four days of field exposure, samples were recollected and stored in a climate chamber. Emerging parasitoids were recorded and used to build up laboratory rearing. To investigate the parasitoids' ability to use *D. suzukii* as hosts, larvae and pupae of *D. suzukii* and *D. melanogaster* were offered in laboratory no-choice parasitization assays.

We collected eight hymenopteran parasitoid species (Table P5.1). The most common one was *Pachycrepoideus vindemmiae* (Rondani) (Hymenoptera: Pteromalidae), a generalist parasitoid of flies that even can act as a hyperparasitoid (Peters, 2009). Unlike *P. vindemmiae*, some parasitoids were only present in certain regions, such as *Trichopria drosophilae* (Perkins) (Hymenoptera: Diapriidae) that was found only in the southern part of Switzerland and *Asobara tabida* (Nees) (Hymenoptera: Braconidae) that was found only in the northern part.

Phenology varied among parasitoids: *A. tabida* and *Leptopilina heterotoma* (Thomson) (Hymenoptera: Figitidae) were captured in decreasing number from early to late season, while *L. bouvardi* (Barbotin, Carton & Kelner-Pillault), *P. vindemmiae*, and *T. drosophilae* were captured in highest numbers during mid-season. To reduce the build-up of *D. suzukii* populations in spring, measures to enhance parasitoid numbers at that time could be advantageous.

Table P5.1. Region, number of emerged parasitoids and number of traps with parasitoids from field collections 2014 und 2015. ZH: Zürich; TI: Tessin; TG: Thurgau; BL: Basel-Land. Adapted from Knoll *et al.* (2017).

Family, species	Region	Number of Individuals	Number of Traps
Braconidae			
<i>Asobara tabida</i>	ZH, TG, BL	58	9
Diapriidae			
<i>Trichopria drosophilae</i>	TI	520	9
<i>Trichopria modesta</i>	TG	4	1
Figitidae			
<i>Leptopilina bouhardi</i>	ZH, TI, BL	2498*	39*
<i>Leptopilina heterotoma</i>	ZH, TI, BL, TG	695*	36*
Pteromalidae			
<i>Pachycrepoideus vindemmiae</i>	ZH, TI, BL, TG	7585	82
<i>Spalangia erythromera</i>	BL	62	2
<i>Vrestovia fidenas</i>	BL, TG	13	2

*2014: A total of 1836 *Leptopilina* sp. emerged from 17 traps.

The sole species that was more abundant in the crop habitats was *P. vindemmiae*, whereas *T. drosophilae*, *A. tabida* and *L. heterotoma* were predominantly found in the semi-natural habitats. Likely, these species are sensitive to temperature and/or humidity changes and therefore prefer semi-natural habitats, which provide rather stable conditions compared to the orchards. Semi-natural habitats could therefore play an important role to sustain natural enemies of drosophilids.

None of the larval parasitoids were able to reproduce on *D. sukuzii* in the parasitization assay, although both *Leptopilina* species reduced the number of emerging *D. sukuzii* significantly. In contrast, all pupal parasitoids used *D. sukuzii* as a host and offspring numbers were comparable to those on *D. melanogaster*.

Thus, native parasitoids could contribute to the control of *D. sukuzii* and information on their phenology and habitat preference is particularly important in this context.

References

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