

Are Asian parasitoids suitable for biological control against *Drosophila suzukii* in Europe?

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Justification for biological control

Drosophila suzukii (Figure 1) is particularly difficult to control because of its short generation time and its very broad host range, including many wild and ornamental plants. The occurrence of *D. suzukii* during most of the year in a wide variety of habitats requires the development of an area wide management approach. Insecticides, mass trapping and sanitation measures are locally efficient but cannot be used on a large scale in non-crop habitats.

Classical biological control through the introduction of specific parasitic wasps (parasitoids) from the region of origin of the fly may represent the only long term solution for a sustainable area wide control of the fly.

Surveys in Asia

Biological control specialists from Switzerland, France, China and Japan, searched for parasitoids in China and Japan since 2015 (Table 1) and found that the most frequent and abundant parasitoids were *Ganaspis* sp., and *Leptopilina japonica*, two wasps attacking young larvae in fruits and killing pupae. Several populations of these parasitoids and others were brought to quarantine laboratories in Switzerland and France for studies on their biology.

Localities (Country, Provinces)	No. of insects	Larval parasitoid genera and parasitism rates (%)						
		<i>Ganaspis</i> sp.	<i>Leptopilina japonica</i>	<i>Leptopilina</i> sp.	<i>Asobara</i> sp.	<i>Tanycarpa</i> spp.	<i>Opiinae</i>	
China	Yunnan	5 200	0 - 42	0 - 34.5	0 - 35.9	0 - 29.4	-	0 - 6.9
	Beijing	8 730	0 - 10.8	0 - 19.9	-	0 - 0.04	-	-
	Sichuan	820	0 - 2.7	0 - 15.2	-	0 - 0.4	0 - 2.1	-
	Hubei	30	0 - 9.7	-	-	-	0 - 3.2	-
	Jilin	2 580	-	-	-	-	-	-
Japan	1 450	0 - 75.6	0 - 1.8	-	0 - 1.2	0 - 2.5	-	

Table 1: Results of the surveys in Asia from 2015 to 2017



Figure 1: *Drosophila suzukii*

Studying the biology and assessing the specificity of the parasitoids

Various aspects of the biology and ecology of the main parasitoids of *D. suzukii* are studied in a quarantine laboratory in Delémont. In particular, the specificity for *D. suzukii* is carefully assessed to avoid the introduction of parasitoids that would attack native flies in Europe. Several populations of the main parasitoids have been tested on seven fly species in different substrates.

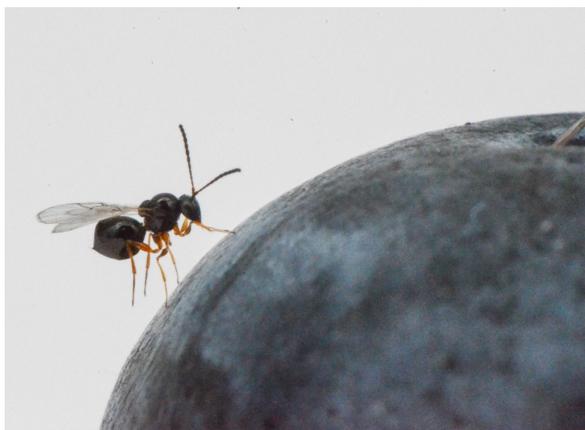


Figure 2: *Ganaspis* sp.



Figure 3: *Leptopilina japonica*

photos: T. Haye

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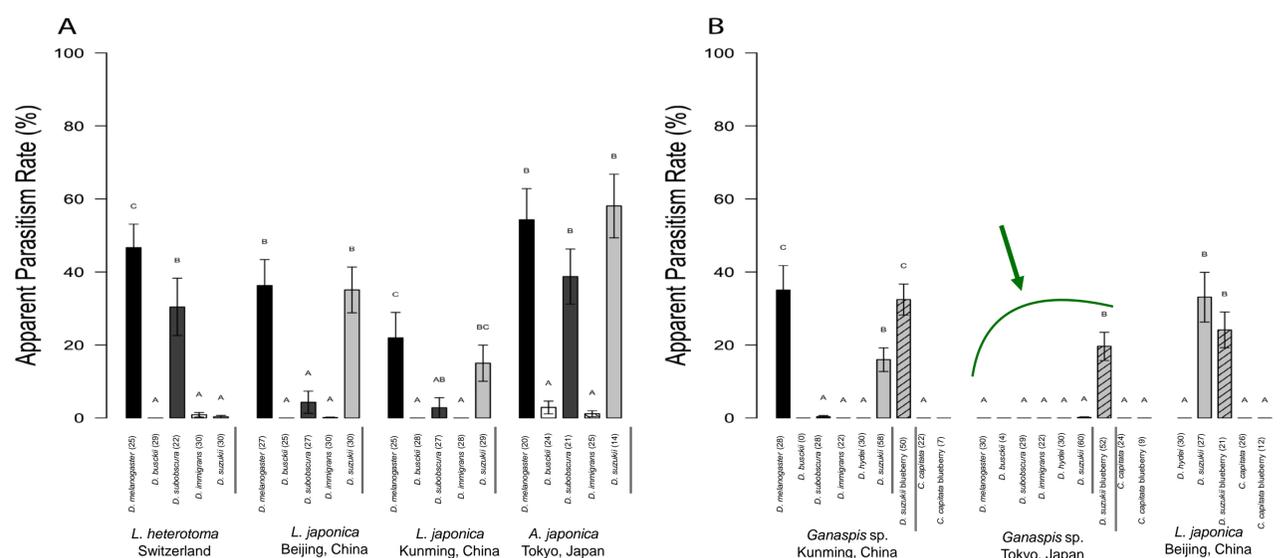


Figure 4. Results of the specificity tests on 7 fly species. A. on artificial diet; B on blueberry and artificial diet enriched with fruits. The green arrow shows the results obtained with the most specific *Ganaspis* sp. population.

Results so far and future work

So far, studies showed that *Ganaspis* sp. is the most specific species, but differences exist between populations. Some populations only attack *D. suzukii* in fruits, refusing even the same host in artificial diets, whereas other populations are able to attack one or two other fly species.

Further studies are needed to select the most suitable population for introduction into Europe. Several geographic populations of *Ganaspis* sp. are presently being tested in no-choice and choice conditions to assess variations in host specificity. Furthermore, the mechanisms leading to host specificity are being assessed using olfactometers and cage tests with different fruits and other substrates.

Finally, the taxonomic status of *Ganaspis* sp. is presently being studied using morphological and molecular tools and cross-mating experiments.

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