

Edited version

Lessons from 3 years with *Drosophila suzukii* in Switzerland

*Catherine A. Baroffio*<sup>1</sup>, *Pauline Richoz*<sup>1</sup>, *Serge Fischer*<sup>2</sup>, *Stefan Kuske*<sup>3</sup>, *Christian Linder*<sup>2</sup>, *Patrik Kehrl*<sup>2</sup>

<sup>1</sup> Agroscope, Research Center Conthey, rte des vergers 18 - 1964 Conthey, Switzerland, Tel +41 27 345 35 11. [catherine.baroffio@agroscope.admin.ch](mailto:catherine.baroffio@agroscope.admin.ch)

<sup>2</sup> Agroscope, Changins, rte de Duillier - 1260 Nyon, Switzerland

<sup>3</sup> Agroscope, Wädenswil, Schloss - 8820 Wädenswil, Switzerland

## Introduction

*Drosophila suzukii* (spotted winged drosophila, SWD) was first discovered in Spain at the end of 2008 and thereafter in Italy in 2009, the South of France and Corsica in 2010, and in Switzerland in 2011 (Kehrl et al., 2012). SWD has a long, sharp, serrated ovipositor, which is much more pronounced than in native species. This toothed ovipositor allows females to pierce the fruit skin. Whereas common vinegar flies attack damaged, overripe or rotting fruits, SWD lays its eggs in healthy, intact, ripe fruits. Although SWD shows a general preference for red and dark fruits, it nevertheless attacks nearly all soft fruits as well as other fruits, such as cherries, peaches, plums, apricots and grapes, figs, kiwi and persimmon. It is abundantly found on cultivated as well as wild fruits (Baroffio and Fischer, 2011). Due to the exponential growth of its populations over the year, late berry cultures are at particular risk, e.g. blackberries (brambles), blueberries and autumn fruiting raspberries. In 2011, Agroscope launched a monitoring survey by placing vinegar traps in crops at potential risk. At the end of the year, the presence of SWD in Switzerland was confirmed. In 2012 and 2013, the monitoring network was intensified to follow population dynamics over time, space and crops at national level. The selectivity of various commercial traps was also compared to our own model.

## Materials and Methods

*Monitoring 2012 – 2013:* The monitoring was conducted in all Swiss cantons. The network consisted of about 200 traps distributed according to the importance of fruit growing areas. The traps consisted of a polystyrene box of 1300 ml (Agroscope trap) containing 200 ml of attractive liquid. The liquid was composed of a mixture of equal parts of apple cider vinegar and water, a small amount of red wine (about 5%) in order to increase the mixture's attractiveness, as well as a drop of detergent to reduce the surface tension of the liquid. A blue sticky trap (Rebell blu ®) was placed in the middle of the trap to facilitate the identification and shipment of captured insects (only in 2012). Between May and July, the monitoring traps were placed in cherry and strawberry crops, followed by raspberry, blackberry, blueberry crops and in autumn they were finally set-up in vineyards. The traps were checked on a weekly basis and the blue sticky traps were sent to Agroscope Conthey for identification of SWD.

*Selectivity of monitoring traps:* The available commercial traps were compared to the Agroscope trap (Salamanca 2012). All traps were filled with 250 ml attractive liquid composed of 50% water, 40% apple vinegar, 10% red wine and a drop of liquid detergent. The traps were checked each week and captured insects were subsequently identified.

## Results and Discussion

*Monitoring:* In less than two years, *D. suzukii* has established itself all over the country. In 2012, more than 60,000 individuals were captured in the 200 traps. The recordings of the population development including crops affected, progression and location of spread were published on the open access website [www.drosophilasuzukii.agroscope.ch](http://www.drosophilasuzukii.agroscope.ch). The insect was captured from the plain to the subalpine zone of the Jura and the Alps. The number of individuals captured increased over the season as a result of the buildup of pest populations over the summer. The peak of insect activity was thus recorded

between mid-September and late October. This peak is in correspondence with the observations in neighboring countries (Grassi et al., 2012). Overall, the number of *D. suzukii* catches was highest in late fruit crops such as raspberries, blackberries and blueberries and in the surrounding of vineyards. Monitoring traps placed in hedges, including elderberry and *Viburnum sp.*, also captured large numbers of *D. suzukii*. In these natural areas, monitoring was continued over the winter 2012-13. Catches fell sharply in the end of November stopping altogether in January (snow being present). Individual captures were once again recorded in February. It may be that a presence of snow cover helps the pest to overwinter. In 2013, catches began 5 weeks earlier.

*Selectivity of monitoring traps:* Only the Agroscope trap with openings of 3 mm showed a high selectivity for vinegar and other small flies. The openings of the commercial traps were at least 1 cm and consequently captured a large number of Lepidopterans, and two also trapped many Hymenopterans. These results show that the primary criterion for a selective monitoring trap is the diameter of the openings, which should not exceed 3 mm. Overall, the ideal trap has an attractive lure, a dark colour, and a high number of small openings (Edwards et al., 2012).

### Conclusions

The spotted wing *Drosophila* is now established all over Switzerland. Late harvested fruits and berries are the most threatened (Baroffio et al., 2013). Overall, fruit growers, local advisors, phytosanitary services and the general public highly appreciated the publishing of the results of the monitoring network on our open-access website [www.drosophilasuzukii.agroscope.ch](http://www.drosophilasuzukii.agroscope.ch). On this webpage they also found further information on the biology and control of this novel pest: in particular phytosanitary measures, such as mass-trapping, early harvesting, the destruction of overripe, damaged and infested fruits and a short interval between harvest and consumption. Overall, these phytosanitary measures were very effective, and almost none of the temporarily approved insecticides were applied by commercial growers. This study demonstrates that monitoring traps can reliably detect the presence of *D. suzukii* in a particular region, crop or plot. The trap must be selective to small insects to avoid beneficial insects such as Lepidoptera and Hymenoptera being caught. Moreover, the surveillance of local populations by monitoring traps prompts fruit growers to observe the dynamics of the pest. This makes them aware of the potential risks and assists them to intervene in time.

### References

- Baroffio, C. and S. Fischer (2011). "Neue Bedrohung für Obstplantagen und Beerenpflanzen: die Kirchessigfliege." UFA Revue 11: 46-47.
- Baroffio, C., P. Richoz, Arriagada B.S., S. Kuske, G. Brand, S. Fischer, C. Linder, J. Samietz, P. Kehrl. (2013). Surveillance de *Drosophila suzukii*: bilan de l'année 2012. RSVH 45(4). 212-218.
- Edwards, D. L., J. C. Lee, et al. (2012). Spotted wing *drosophila* monitoring: building a better fly trap. 71st Annual Pacific Northwest Insect Management Conference, Portland.
- Grassi, A., L. Palmieri, et al. (2012). *Drosophila (Sophophora) suzukii* (Matsumura), new pest of soft fruits in Trentino (North-Italy) and in Europe. IOBC wprs Bulletin 70: 121-128.
- Kehrl, P., H. Höhn, et al. (2012). La drosophile du cerisier, un nouveau ravageur dans nos cultures fruitières. Rev. Suisse de Viticulture Arboriculture Horticulture 44: 69-71.
- Salamanca, B. (2012). Monitoring und Bekämpfungsstrategien gegen *Drosophila suzukii* in der Schweiz, Hochschule RheinMain, Fachbereich Geisenheim - Studiengang Gartenbau: 23.