



# *Drosophila suzukii*

## 3 years experience in Switzerland



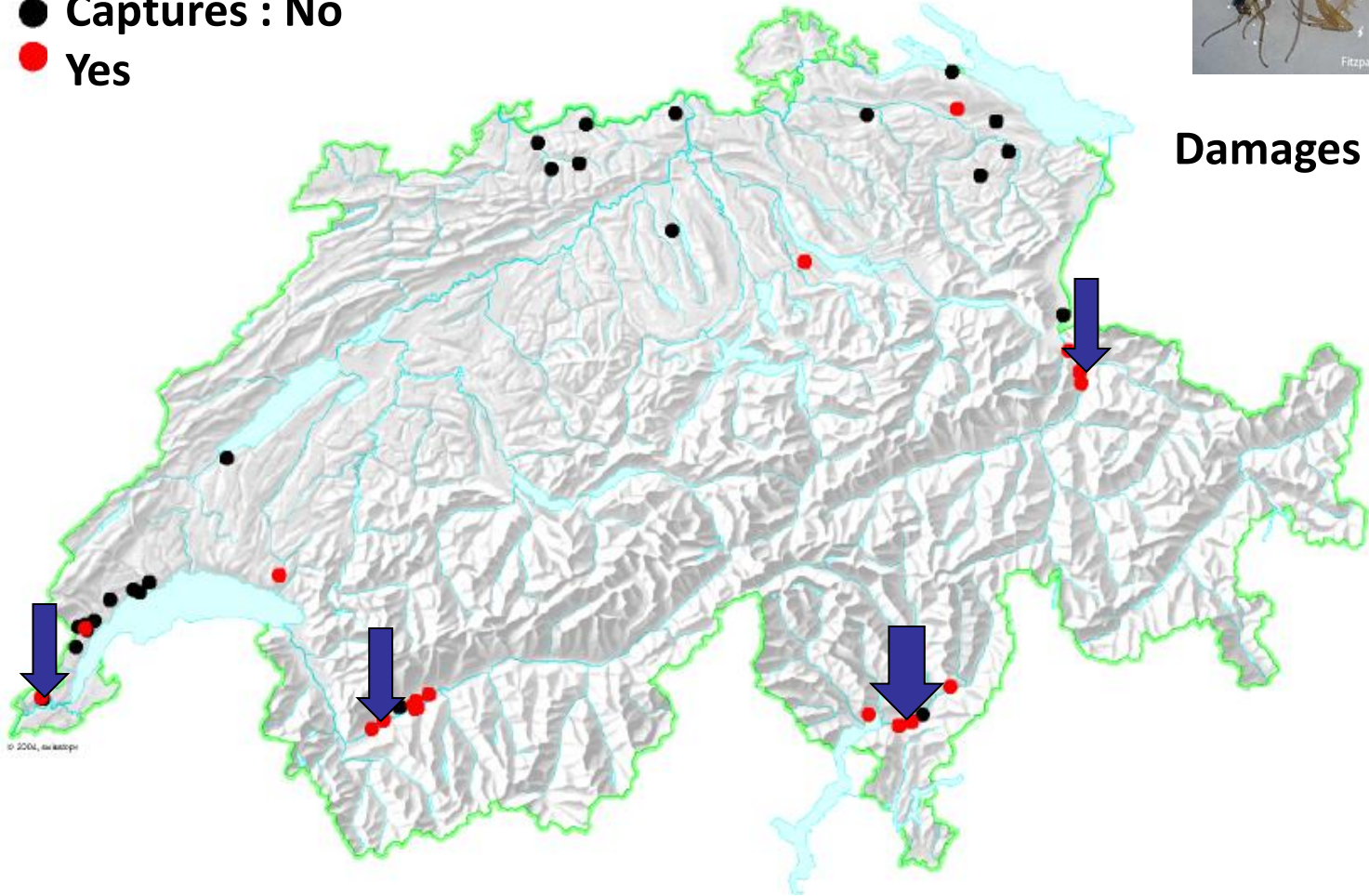
C.A. Baroffio, S. Fischer, P.Kehrli, S.Kuske, C.Linder, P. Richoz



# Situation in 2011

## Monitoring 2011

- Captures : No
- Yes

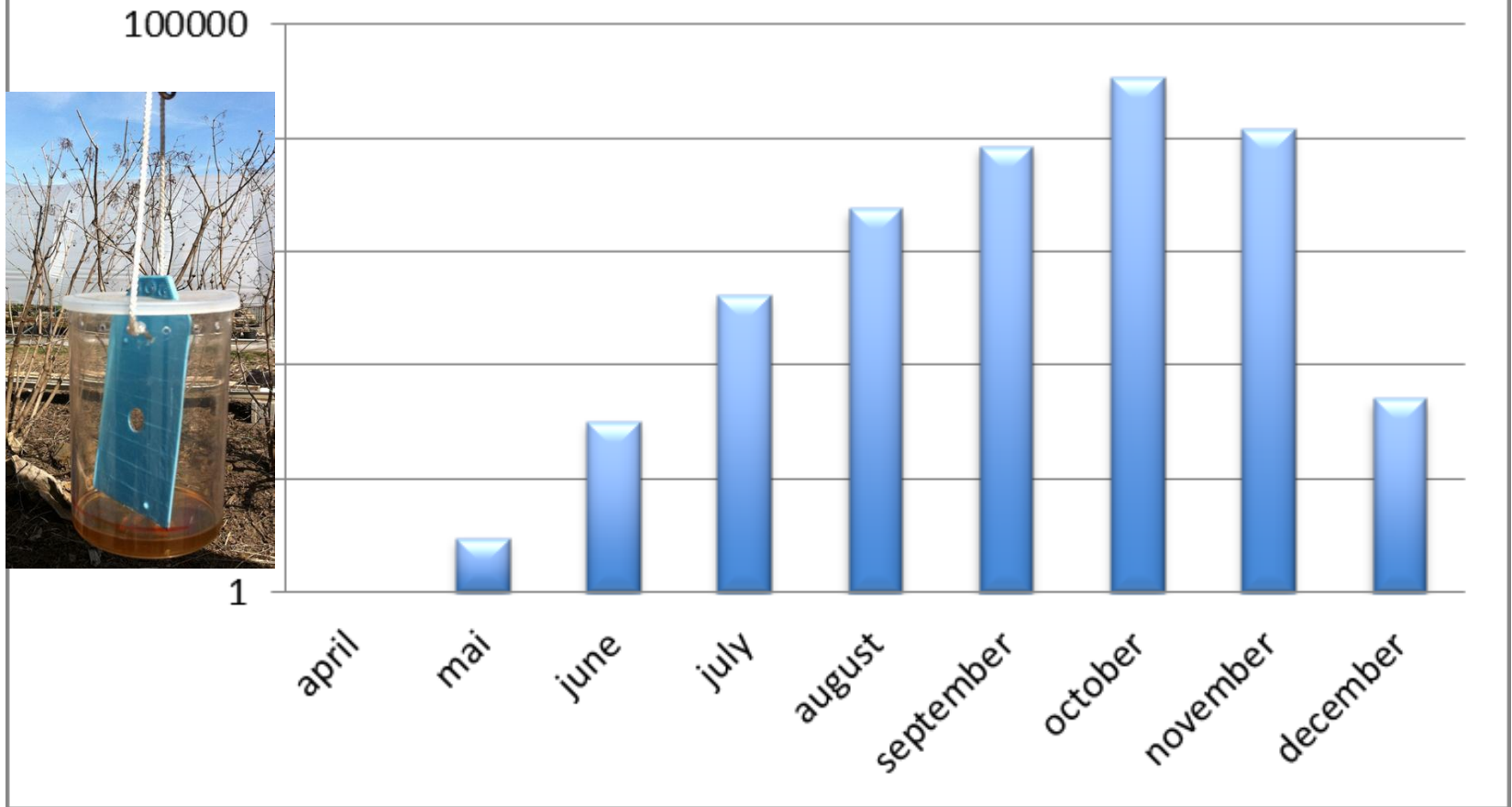


Damages



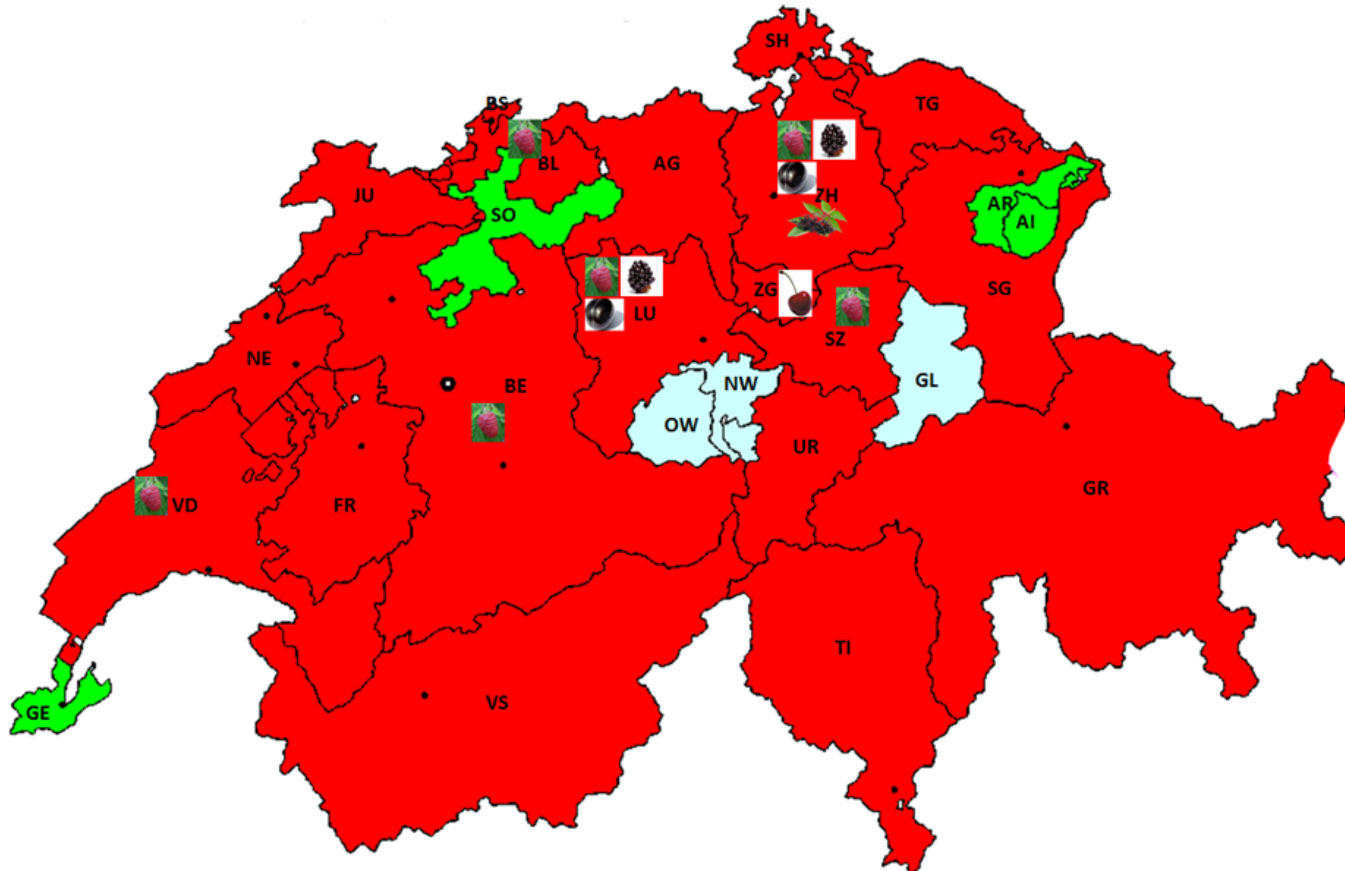


# Monitoring 2012





# National monitoring network 2013



# Selectivity test for various models of monitoring traps (field) in 2012

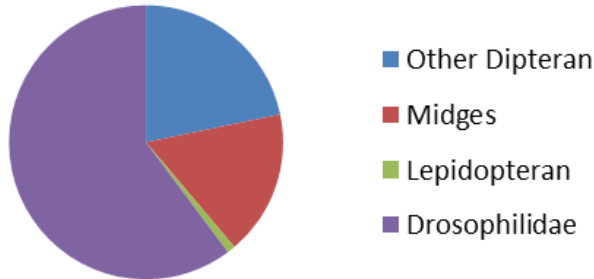
**Table 1: Trap Description**

			
<b>Droso-Trap</b> Vol.: 1300 ml 3 lateral openings Ø 1.2cm	<b>McPhail</b> Vol.: 2600 ml 1 basal opening Ø 4.5cm	<b>Sentomol</b> Vol.: 1000 ml 12 lateral openings Ø 1cm	<b>Agroscope</b> Vol.: 1300 ml 16 lateral openings Ø 3mm

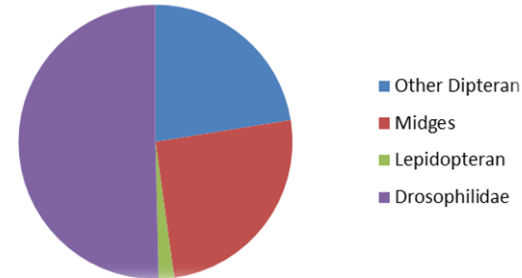
- Aim: estimate the potential impact on the entomofauna
- Lure used: cider vinegar + water + (+ red wine) wetting agent

# Selectivity test for various models of monitoring traps in cherry and raspberry in 2012

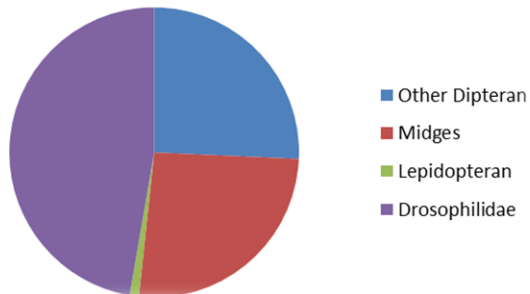
## Drosotrap



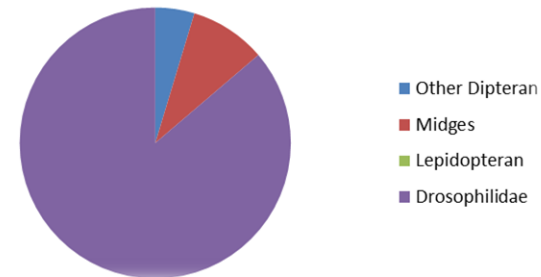
## Mc Phail



## Sentomol



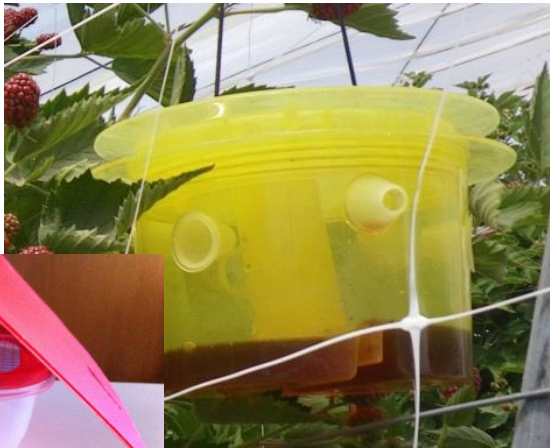
## ACW trap



- Trap ACW completely selective for small insects (> 95 % Drosophilidae)
- Droso Trap was improved by placing a net in front of the openings

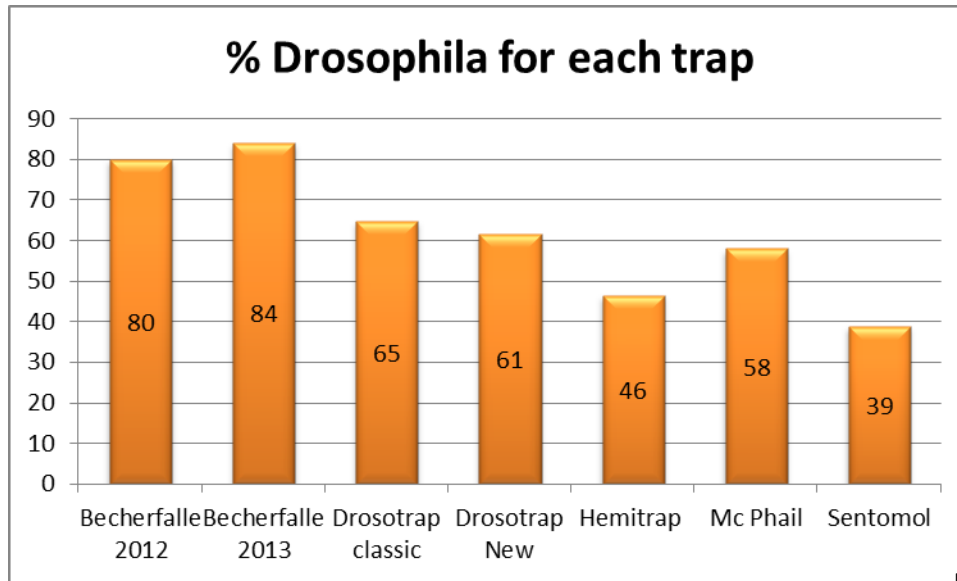


# Selectivity test 2013

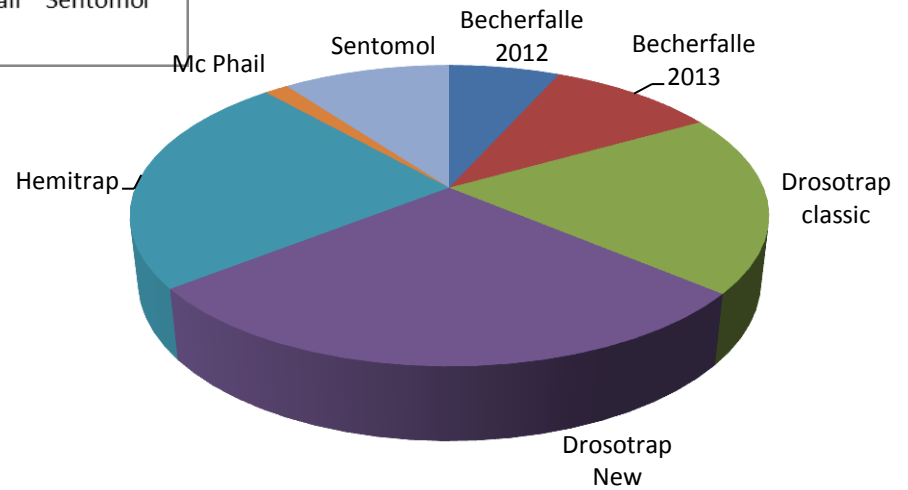




# Selectivity test 2013



### Drosophilidae effective catches

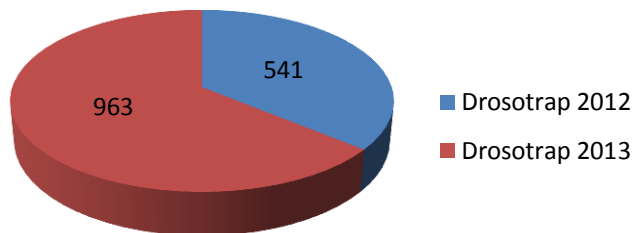




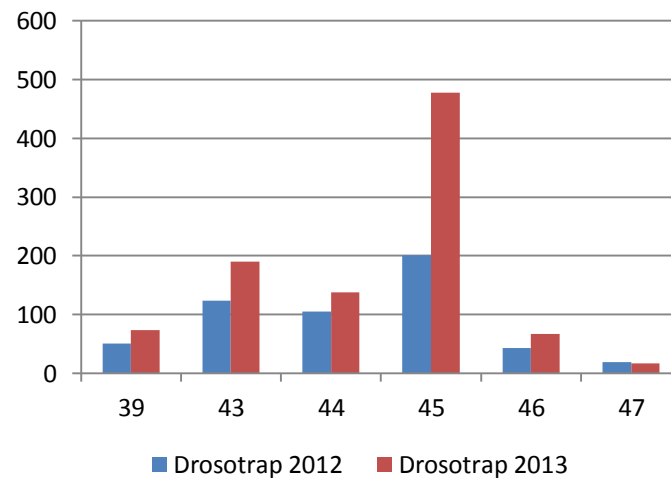


# Essai Drosotrap 2012 vs Drosotrap 2013

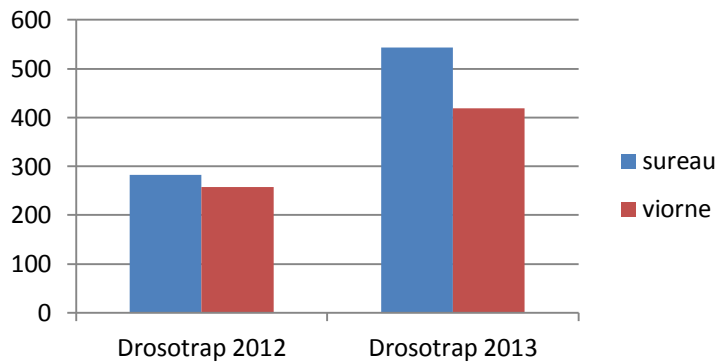
captures total, 6 semaines

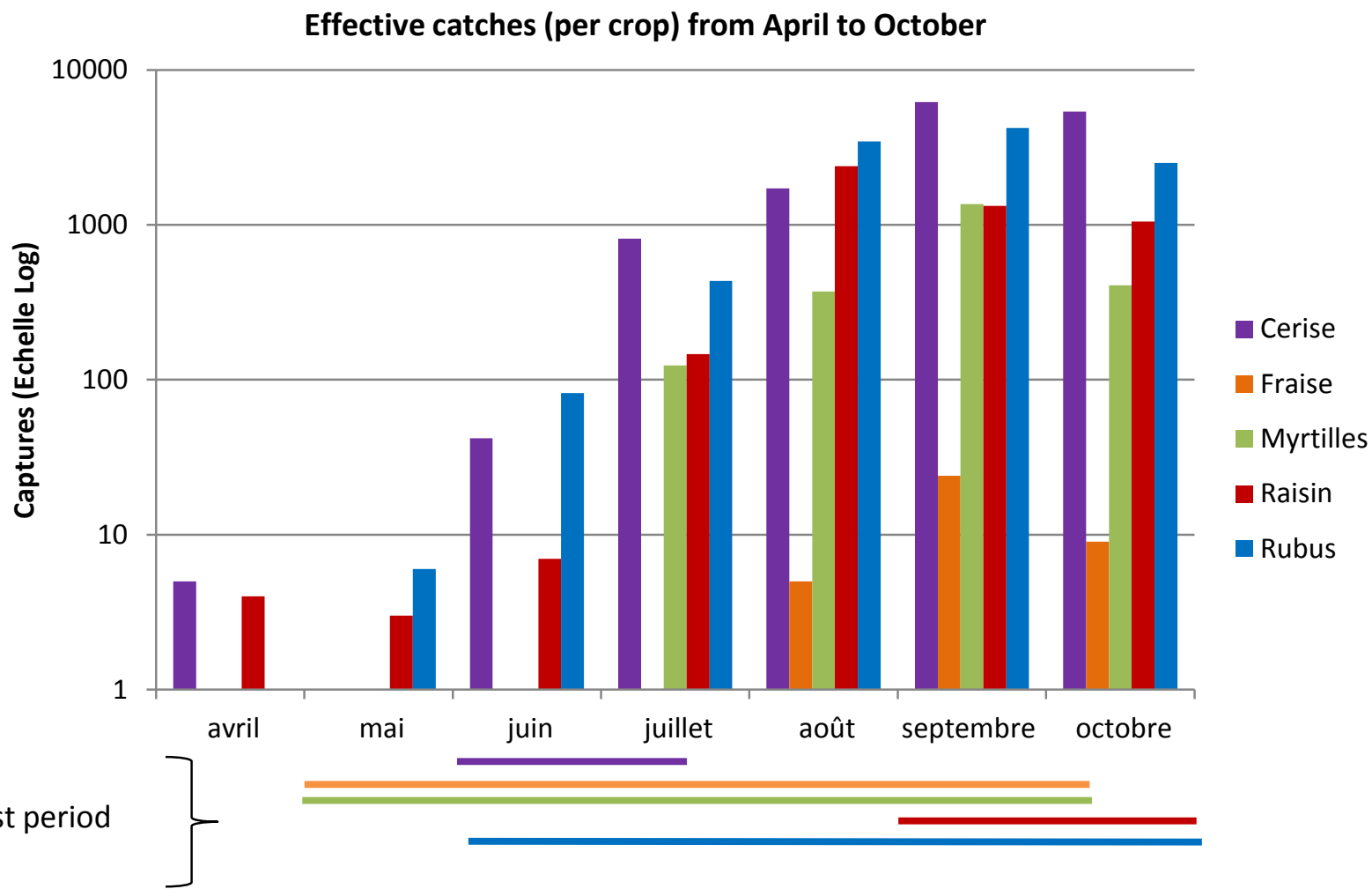


captures total par semaine



captures total par lieu







# Control strategy





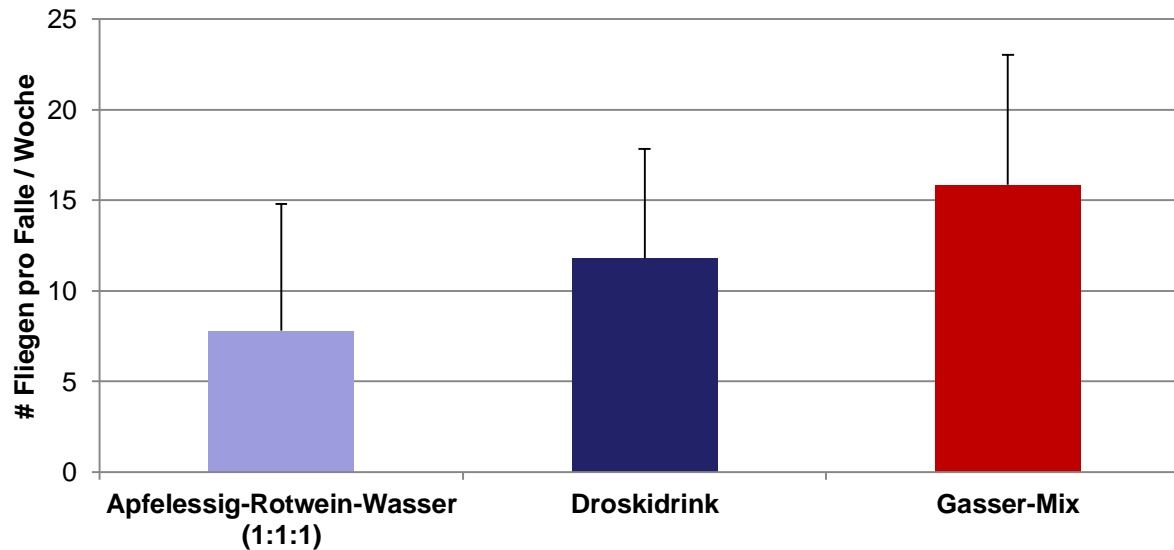
# Lure comparison

**Crop:** Rubus sp.

**Period:** 29.8.-12.9.

**Trap:** ACW-trap 1,8dl, transparent,

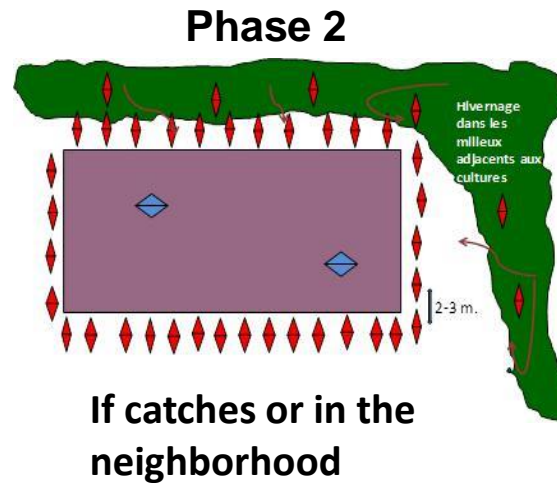
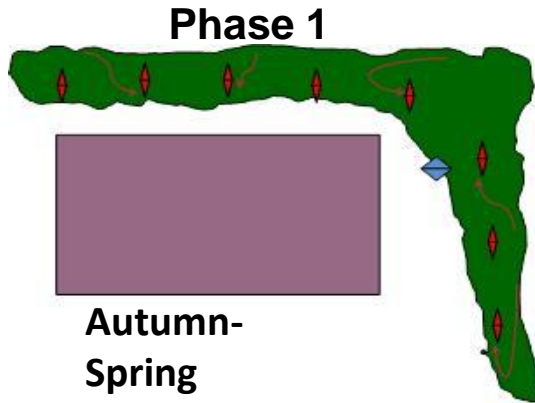
**Layout:** randomized block design





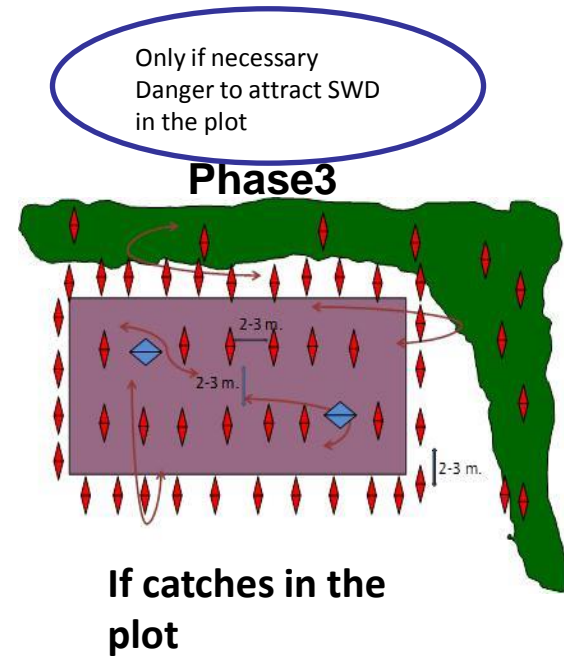


# Control strategy

## Mass trapping, principle



-  Mass trapping
-  Monitoring trapping





# Different cases

## Situation 1 : Damages → Economic losses

County	Crop	Environnement	Mass trapping	Regular harvest	Sanitary measures	Damage intensity
Lucerne	Cherry net 1.3mm	Wood, Elderberry, plums	no	yes	no	Weak, end of harvest
Lucerne	Plum Var. Tophit	Wood, cherry	no	yes	no	Weak
Lucerne	Raspberry soilless tunnel	Wood, orchard, blueberry	yes	yes	no	Weak – damage on overripe fruits
Vaud	Strawberry HS tunnel	Summer raspberry	yes	yes	yes	Weak
Tessin	Strawberry HS; Raspberry open field	Wood	Fraise :oui Framboise : non	yes	no	Strong
Bâle	Blackberry, Raspberry	Wood, edges	yes	?	?	Strong
Berne*	Raspberry open field	Cherry, plums	yes	yes	yes	Strong



# Different cases

## Situation 2 : Pest under control, weak damages

County	Crop	Environnement	Mass trapping	Regular harvest	Sanitary measures	Damage intensity
Schwyz	Autumn raspberry	Meadows, cherry, hedges	yes	yes	yes	Weak, under control
Lucerne	Autumn raspberry, blackberry	River, hedges, meadows	yes	yes	yes	Weak, under control
Tessin	Grapes Merlot	Wood, river,	yes	yes	yes	Weak, under control Early harvest



# Different cases

## Situation 3 : No damages

County	Crop	Environnement	Mass trapping	Regular harvest	Sanitary measures
Schwyz	Strawberry, raspberry, blueberry, minikiwi, cherry, plum	Prairies, champs, habitations	yes	yes	yes
Schwyz	Cherry, apricot, plum	Vergers cerise, prairies, forêt à 200m	no	yes	no
Schwyz	Raspberry	Vergers cerise, bosquets	yes	yes	yes
Valais	Blackberry, tunnel	Fraise, framboise été, vergers cerise	yes	yes	yes
Grison	Raspberry, blackberry, strawberry, blueberry, goosberry	?	yes	yes	yes

Malgré des populations de *D. suzukii* importantes (nombreuses captures dans les pièges situés dans les cultures) des dégâts n'ont pas été observés.

- Le piégeage de masse a été mise en place dès la détection du ravageur
- Les récoltes ont été régulières
- Les mesures d'hygiène ont été respectées





# Control strategy

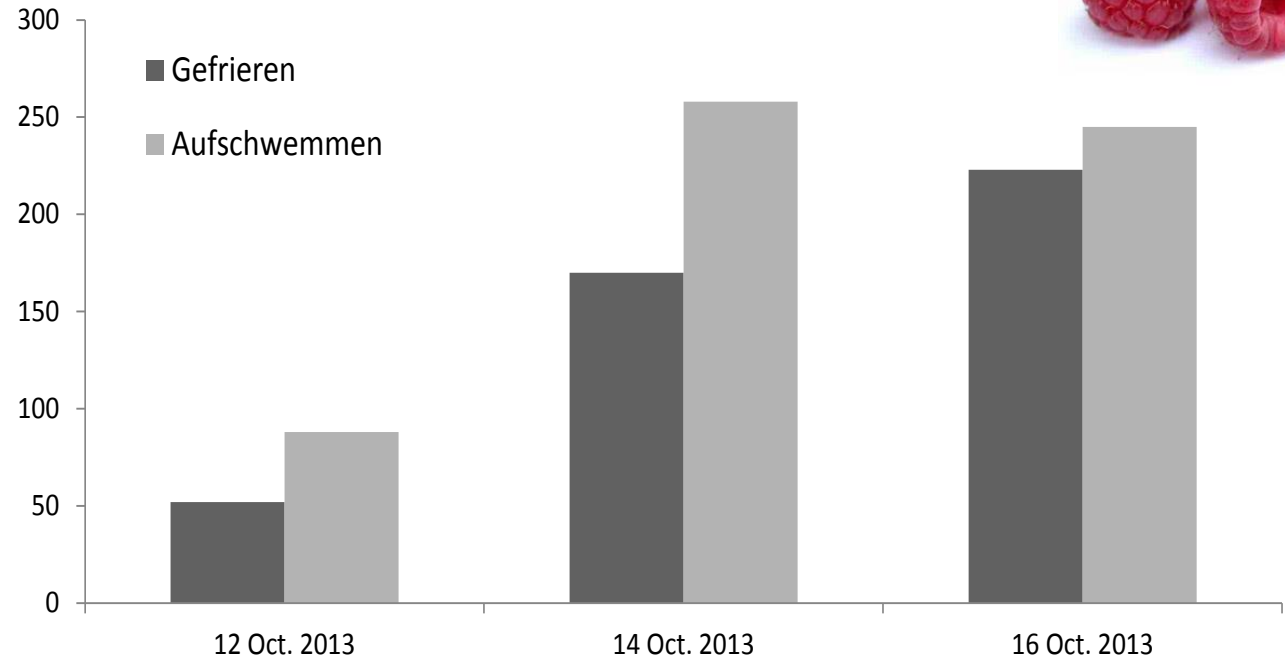
## Control method:

- Weekly 50 fruits in the freezer
- Larvæ come on the fruit surface!





# Control, raspberry freeze / salted water



Freezing doesn't work for bigger fruits (strawberry, plums...)



# Sanitary : **important**

- **Short intervall between 2 yields**
- **Over mature fruits away**
- **Nothing on the ground**



**destruction  
without oxygen**





# Control strategy parasitism

- Parasitism:
  - Japan:
    - *Asabora japonica* (Ideo, 2008) but still damages in cherry and blueberry (Tamada, 2009; Kanzawa, 1939)
  - Europe:
    - *Trichopria drosophilae* (trial in France in greenhouse with artificial inoculation)



# Trials 2013-2014

- Repulsive plants in tunnels (*Ocimum kilimanscharicum*, *Geranium sp.*)
- Evaluation of mass trapping efficiency with / without sanitary measures (new traps in test)
- Study of the interaction *D.suzukii* / indigenous *Drosophila* (lab, cultures)
- Study of wintering: places, resistance, physiological state... (lab, nature)



# Conclusions Monitoring / Survey

- Trap must catch the 1st SWD
- Find the » right crop « (Cherry / Rubus / wild berry)
- Price must not be a decision factor: it can be expensive
- By the 1st catch, communication on control with traps / sanitary measures
- Coordination at national level
- Private gardens / self-picking! Big reservoirs



# Conclusions Mass Trapping / Control

- Trap must be efficient and cheap
- Small garden / big surface
- Price is a decision factor
- Maniability (round bottom / change the liquid)
- **Traps to be set as soon as the 1st catches occurs in the monitoring trap**
- Lure must last 3 weeks (change just once in the berry)
- Trap line between hedge (wild berry) and crop
- Sanitary measures must be combined with mass trapping
- Conservation to 2°C during 4 days reduces / stops the development (fruit quality???)



# Conclusions Ecology SWD

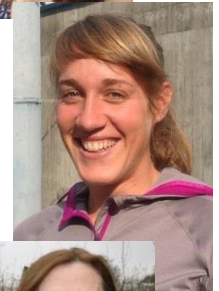
- Shady areas
- Humidity (needs water / dies in 24hrs without water)
- Activity reduced when higher Temperatures (30°C), heavy rains and winds > 14 km/h
- Can resist to colder temperatures (catches at 1500m / with 5°C in 1100m: still activity)
- No evidence of varietal preference in strawberry (France)
- Parasitism still not efficient





# Questions / problems unsolved

- Percent of overwintering population / imported fruits
- Overwintering: gravid females mostly // importance and danger of early crops in heated greenhouses
- Competition with indigenous *Drosophila*
- How long to a stabilisation of the population?
- Lack of trials with control on farm
- Communication (balance between producers / consumers)



**Vielen Dank,  
merci beaucoup!!!**