From lab to field: Development of a biocontrol strategy for *Rhagoletis cerasi*

>Claudia Daniel & Eric Wyss

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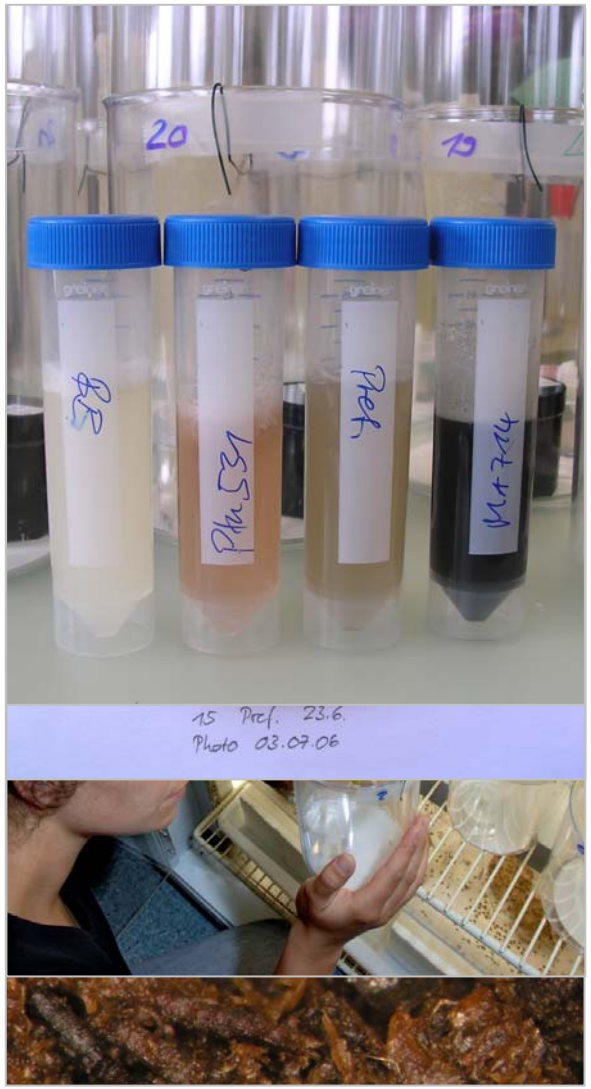
Problem

Series of 7 laboratory experiments

- **6 fungus isolates:**
  - *Beauveria bassiana* ATCC74040
  - *Metarhizium anisopliae* 714
  - *Metarhizium anisopliae* 786
  - *Paecil. fumosoroseus* Apopka 97
  - *Paecil. fumosoroseus* 531
  - *Paecil. farinosus* 954
  - **Cultured on semi-selective agar-medium**
  - **Conidia suspensions were sprayed directly onto the flies**
- **Field collected flies from infested cherries**
  - **Conditions: 23°C (day) / 17°C (night); 16h light; 65% RH**
- **Evaluation of:**
  - **Mortality, mycosis, fecundity, fertility**



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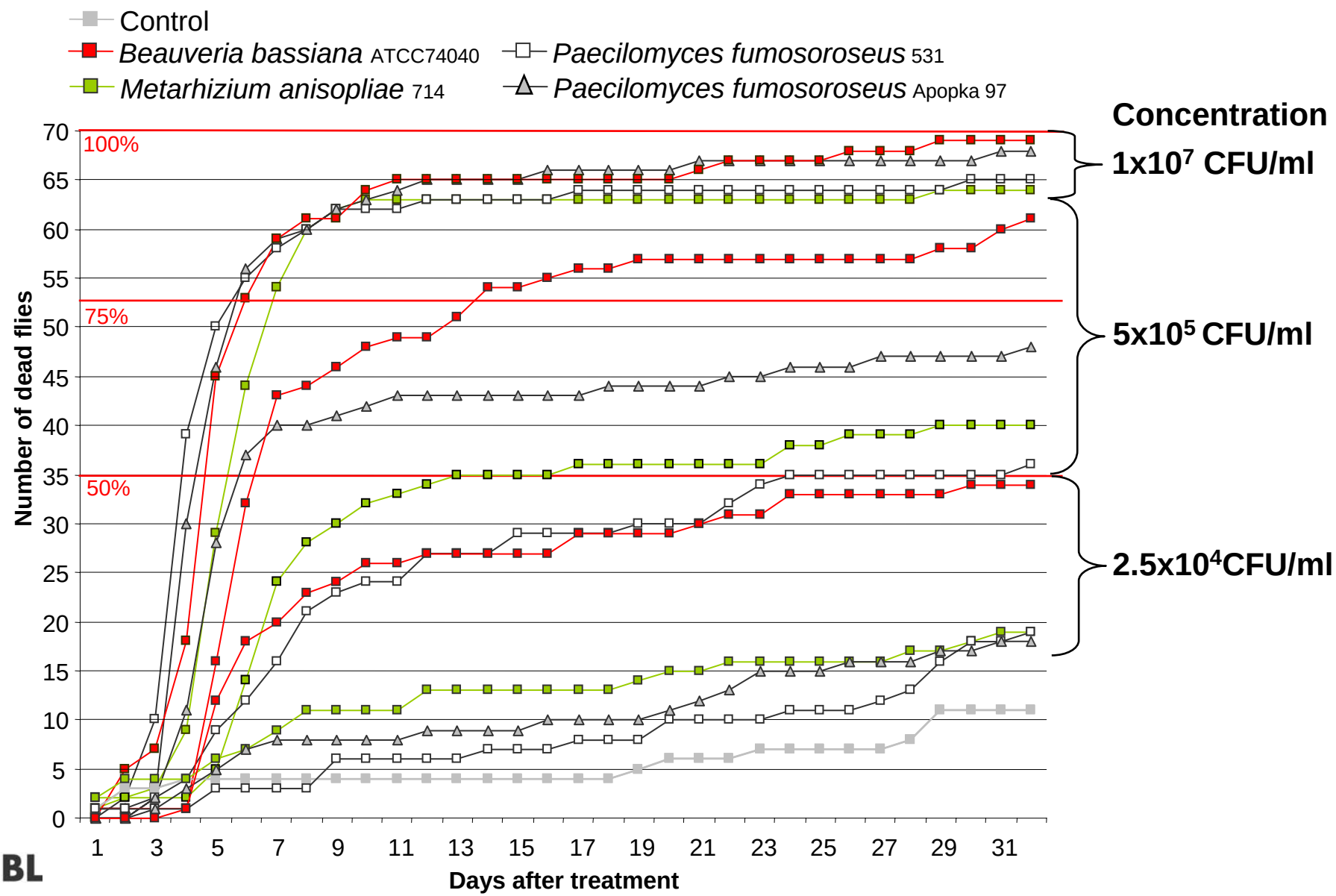
Daniel & Wyss (2009), Journal of applied Entomology. 133: 473-483.

Mortality

Adult flies (1-5 days old; 9 females, 5 males, 5 replicates) were treated with conidia suspensions in 3 concentrations.



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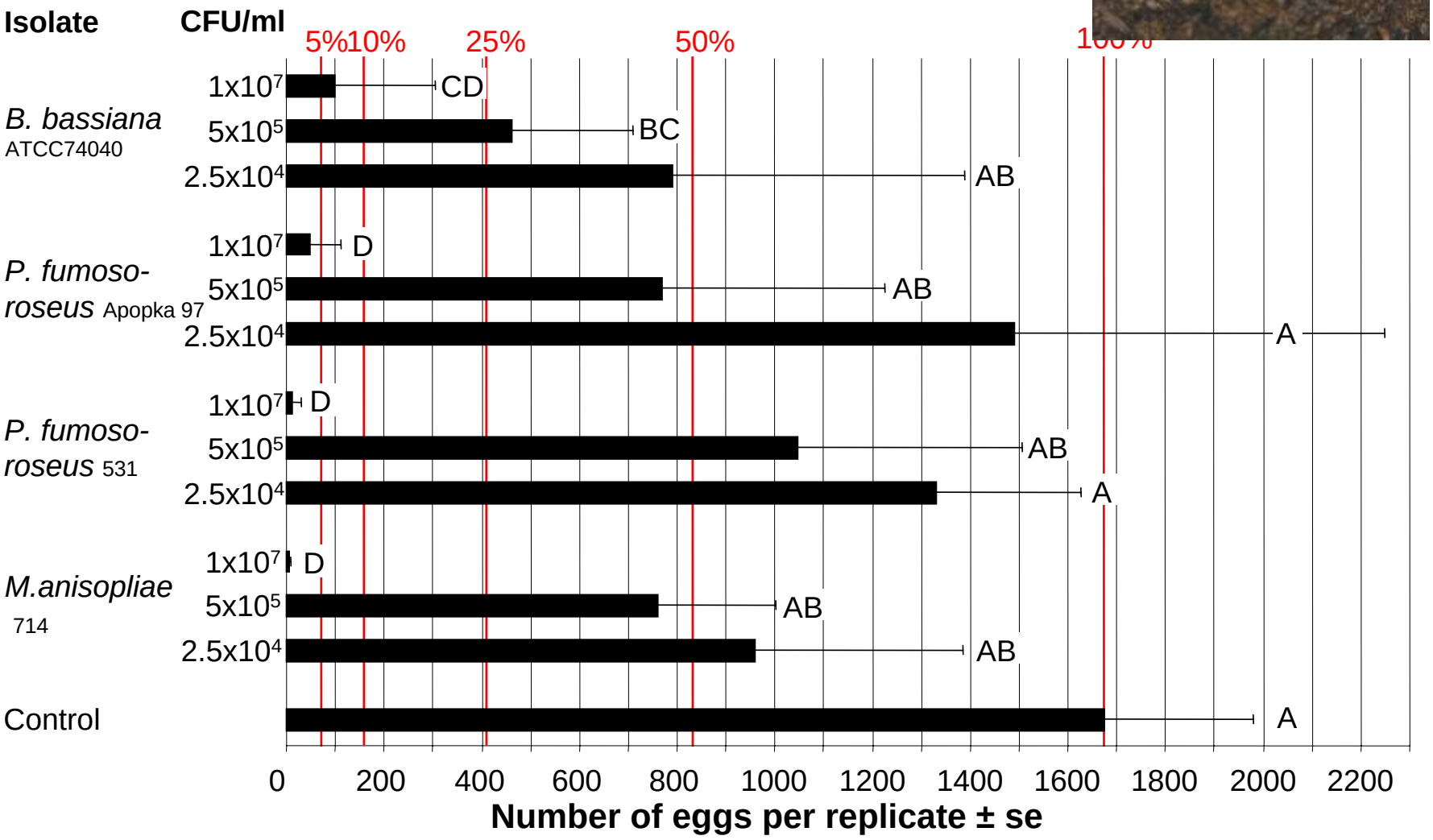

Statistics: Data transformed [√(x+1)], One-way ANOVA, Tukey test α=0.05; $F_{12,52}$=21.0646, p<0.0001

Conclusion lab-experiments

- **First evidence that *R. cerasi* is susceptible.**
- **Adult flies are highly susceptible.**
- **Fungus isolates differed considerably in virulence.**
  - ***Paecilomyces farinosus* 954: low virulence.**
  - ***Beauveria bassiana* ATCC 74040: Most efficient at low concentrations.**
- **Susceptibility of larvae was very low; efficacy under field conditions is assumed to be negligible.**
- **Infestation of flies during emergence by soil treatments is possible.**

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Field experiments: Foliar applications

- Naturalis-L (*B. bassiana*) & PreFeRal®WG (*P. fumosoroseus*)
- Naturalis-L in all orchards; PreFeRal®WG only one experiment
- Completely randomized block design with 4 – 7 replicates
- Concentration: 5.75 x 10^4 CFU/ml
  (250ml Naturalis-L / 100l; 2.88g PreFeRal®WG / 100l)

Year	2006	2006	2007	2007	2007
Orchard	Sissach 2	Sissach 4	Sissach 2	Sissach 3	Eptingen
Age of trees	6 years	6 years	7 years	8 years	30 years
Intervals	7d intervals 4 treatments	7d intervals 4 treatments	7d intervals 4 treatments	7d intervals 4 treatments	7d – 5 treatments 14d – 2 treatments

- 1st treatment: within 5d after beginning of flight period
- Last treatment: 7-14 d before harvest

Monitoring of flight intensity

- One yellow sticky trap per tree
- Reduction of flight intensity by 18-45%
- Infestation of flies under field conditions is possible.

Degradation of conidia

- Leaf samples
- Conidia on cherry leaves remain active for 7 days: repeated applications are necessary.

Conclusions

- Experiments in 2 years in 4 different orchards.
- Naturalis-L reduced fruit infestation by 65%.
- Application regime must be adapted to flight period of *R. cerasi* and to cherry variety.
  - First treatment: 7 days after beginning of flight period.
  - Treatments in 7 day intervals.
  - Last application: 7 day before harvest.
- Naturalis-L registered in Switzerland and Italy.
- The problem is solved for organic cherry production.

- Experiences in 2009:
  - Advisory service is important.
  - Additional phytosanitary measures are necessary.

Many thanks to…

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