Fertility, longevity, oviposition dynamic and sex-ratio of Scaphoideus titanus Ball.

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Wien, October 19-22 2015
The multi-annual model of *Scaphoideus titanus*

The goal is to transform the model into one that simulates the real population density in the vineyard

Simulated multi-annual occurrences of *S. titanus* at Contone (CH)
Goal of the study

In field application, the model requires the quantification of various biological parameters of *S. titanus* to estimate the population density.

The most important parameter to quantify are:
- fecundity rate
- oviposition dynamic
- longevity of females.

There is sufficient data in the literature?
What we know from the literature

- The fecundity of females is estimated at 10–15 eggs on average until up to 20 eggs (Vidano, 1964; Cravedi et al., 1993; Bosio and Rossi 2001; Linder and Jermini; 2007; Eriksson et al., 2012, …).
- Females starting to lay eggs 10 days after their emergence (Schvester et al., 1962).
- Longevity of adults is estimated at about 1 month (Schvester et al., 1962).

The question is: We can use this data?
Materials and methods

- A field study was undertaken during 2012 and 2013 in two vineyards (Biasca and Bironico) outside the mandatory control zone.
- Adults were collected using 14 yellow sticky traps (Aeroxon) per vineyard placed horizontally inside the vine canopy and in 2013 also with frappage.
- Sticky traps replacement and frappage were made weekly.
- Males and females were discriminated in laboratory.
- Eggs were counted in the female abdomen after dissection.
Sex ratio Biasca 2013

Frappage

Yellow sticky trap

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Sex ratio Bironico 2013

Frappage

Yellow sticky trap

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Bironico 2012 (sticky traps): number of eggs contained in the abdomen of females

Date
16.07  30.07  13.08  27.08  10.09  24.09  08.10

Number of eggs
0  5  10  15  20  25

Red line = mean  Black line = median
Biasca 2012 (sticky traps): number of eggs contained in the abdomen of females

Date

16.07  30.07  13.08  27.08  10.09  24.09  08.10

Number of eggs

0  2  4  6  8  10  12  14  16  18  20

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Bironico 2013 (sticky traps): number of eggs contained in the abdomen of females

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0  2  4  6  8  10  12  14  16  18  20
Conclusions of the field trial

- Sex ratio confirmed the protandry of *S. titanus* independently of the sampling technique.
- The percentage of males was higher for a longer time on the yellow sticky traps.
- At the beginning of the adult emergence, more than 98% of the females did not have eggs.
- In average, $7.6 \pm 1.5$ eggs/female were found in 2012 and $8.6 \pm 1.51$ in 2013.
- The number of eggs/female showed an important variability.

To explain the dynamic observed in the field, a second study was conducted in the lab.
Scheme of the lab experiment

Constant temperature of 23 °C

- Adult emergence
- Mating
- Start of oviposition
- End of oviposition
- Death

Virgin females 74 days / Mated females 61 days

8 days 7 days 34 days

Nymph

♀ + ♂

♀ oviposition substrate/counting eggs every 2 days

31 mated and 10 virgin females
Longevity of virgin and mated females

Average: mated 61 ± 24 and virgin 74 ± 32 days
Interval between adult emergence and mating

Average: 8 ± 2 days
Interval between mating and first egg deposition

Average: 7 ± 3 days
Duration of oviposition

Average: 34 ± 18 days
Oviposition rate

Average: 38 ± 23 eggs/female
Eggs in abdomen after death

Average: 13 ± 6 eggs/female

Mated females (31)
Conclusions

These preliminary results indicate that:

- The data reported in the literature underestimated both the real oviposition potentiality of the females and their longevity.
- It seems necessary to undertake a specific study to quantify these parameters at different temperatures.
Grazie per la vostra attenzione

Agroscope  alimenti buoni, ambiente sano