Population structure of the *Maculinea alcon* in Portugal

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Torino
Pinerolo
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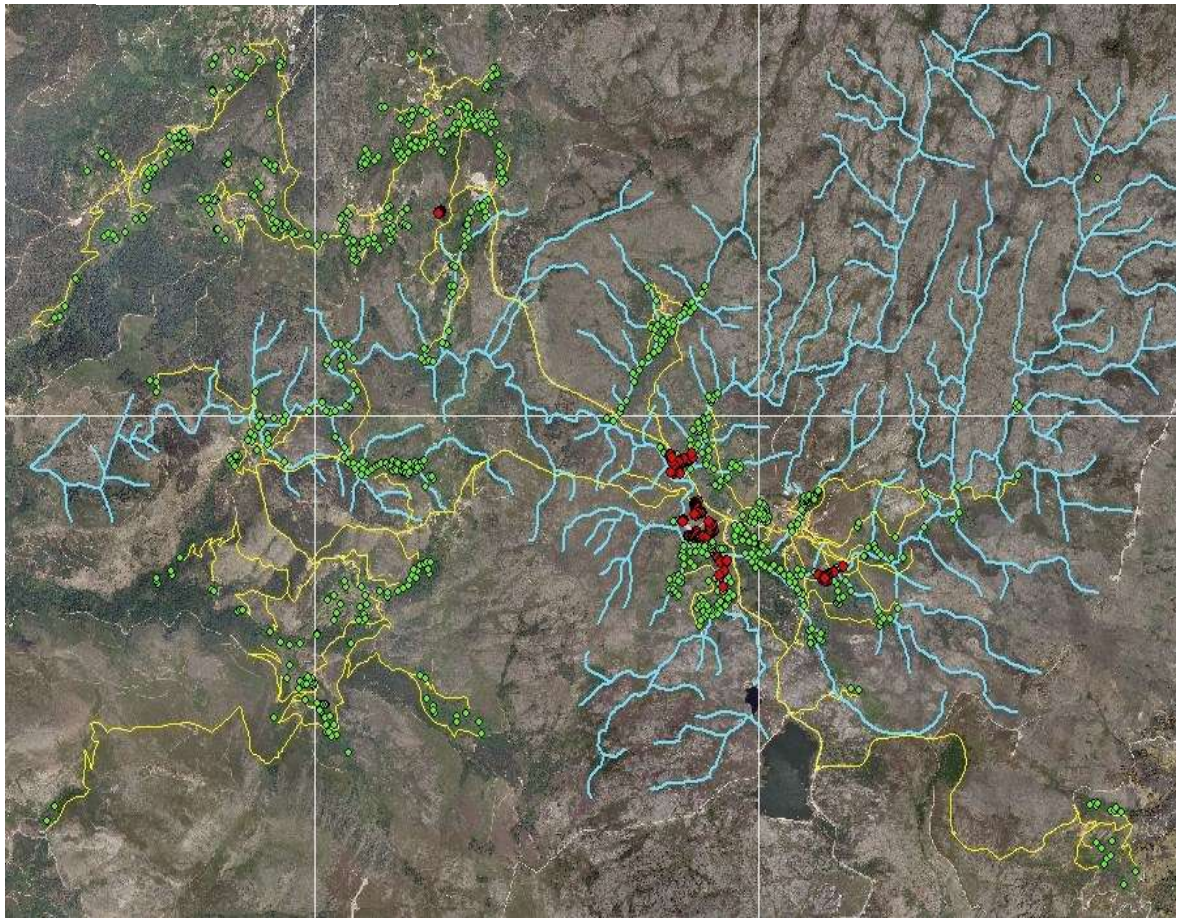
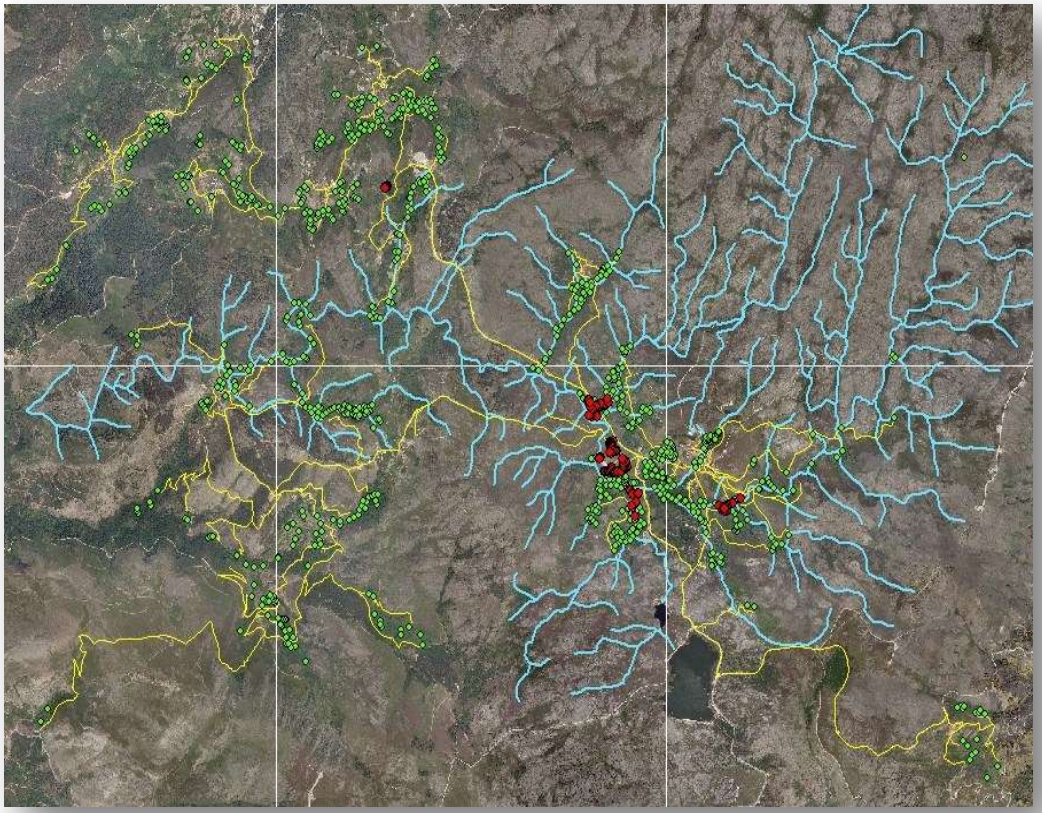
Savona



In October 2008 an intensive field work was done for data collection and survey of the distribution of *Gentiana pneumonanthe*



***Gentiana pneumonanthe* grows well:**

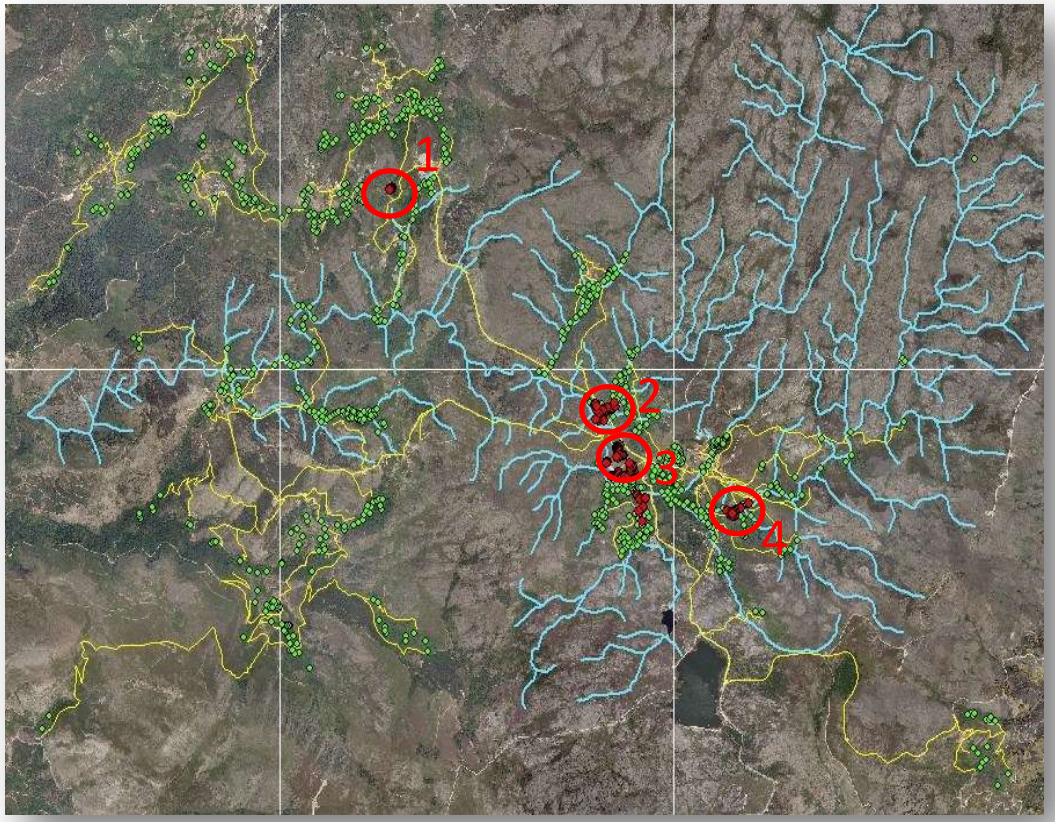
- in shrub land, with good exposure to sunlight, gentle slopes and proximity of running water.
- In the fringe of agricultural land, close to irrigation channels, which minimizes the effects of frost in the winter.
- In almost all the observations, it was notice the presence of *Quercus robur* and *Quercus pyrenaica* trees in the surrounding area.
- It was also noticed that *G. pneumonanthe* grows well in abandoned agricultural land, but the development of high shrubs (Genista sp., Erica sp.) make difficult the flowers' access by *M. alcon,* which was evidenced by the eggs' absence.

Host ants of the M. alcon populations in Portugal

- Just before the flying period of the butterfly, between 2007 and 2009, *Myrmica* nests were searched within 2 m (the approximate foraging zone of *Myrmica* workers, see Elmes et al. 1998) around *Gentiana pneumonanthe* L. host plants in four patches of a marshy meadow.

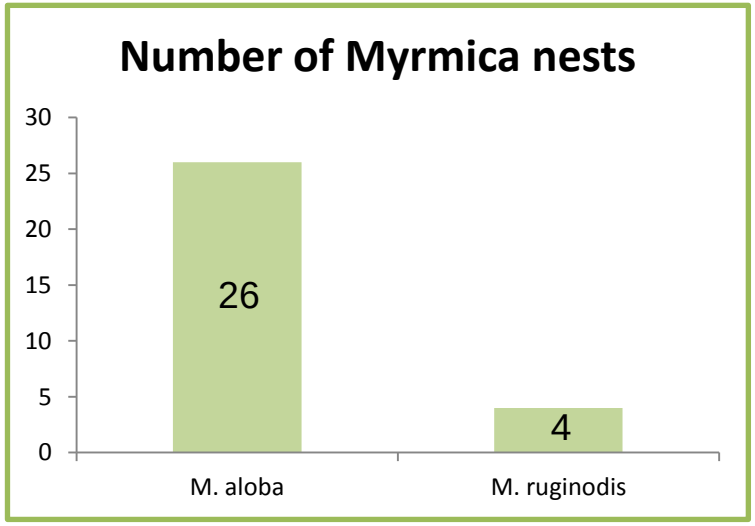
- *Myrmica* nests found were carefully opened and searched for fully-grown larvae and pupae.

- Identifications were made by Andras Tartally and Sándor Csősz



Host ants of the M. alcon populations in Portugal

- *Myrmica aloba* was found in all patches.
- *Myrmica ruginodis* was found in patches 2 and 3.
- In 12 *M. aloba* nests, M. alcon were found (46% infestation).
- A total of 52 *M. alcon* individuals (maximum 32 in one nest).

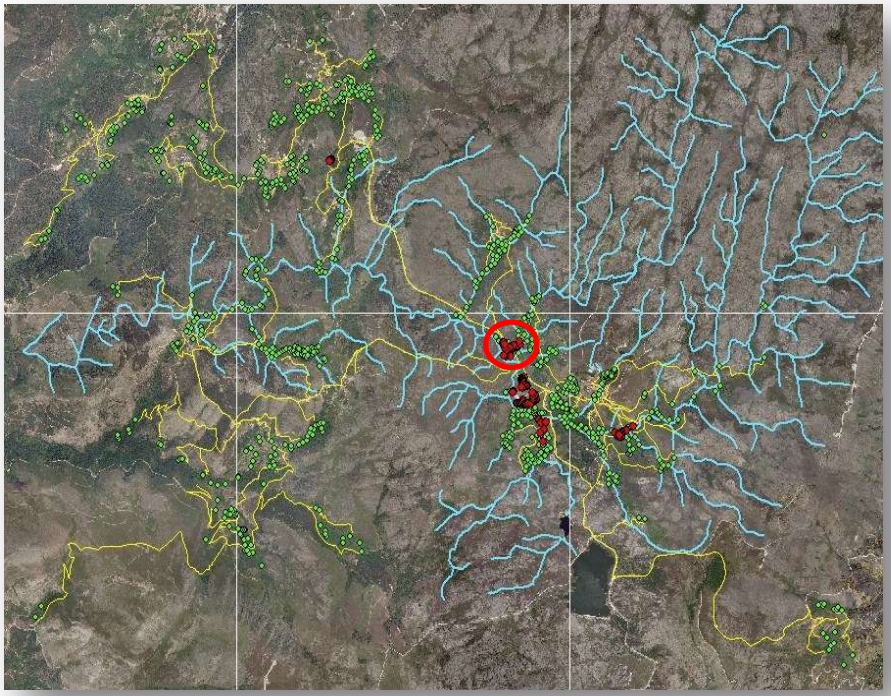


Host ants of the M. alcon populations in Portugal

Myrmica aloba was found as host in all four patches and in all three summers. Thus, this ant species appears to be the most important host of this butterfly in this locality.

The flight period of the butterfly was followed by capture-recapture methods to evaluate populations parameters

2006-2011



Same daily time sample effort and same transept across studied years.

Variation on number of sample times between years

The flight period of the butterfly was followed by capture-recapture methods to evaluate adult populations dynamics

Year	Recapture events	Marked individuals			Recaptured individuals			Recapture ratio (%)
		Males	Females	Total	Males	Females	Total	
2006	11	102	116	218	5	5	10	4.59
2007	9	154	111	265	31	18	49	18.49
2008	8	141	122	263	10	7	17	6.46
2009	9	318	248	566	19	27	46	8.13
2010	20	439	257	696	134	64	198	28.45
2011	26	567	470	1037	210	153	363	35,00

Results of the CMR of *Maculinea alcon* per studied year: number of recapture events, number of marked and recaptured individuals separately by sex and recapture ratio

Several data sets did not contain enought recaptures to allow model selection to be achieved, so ….

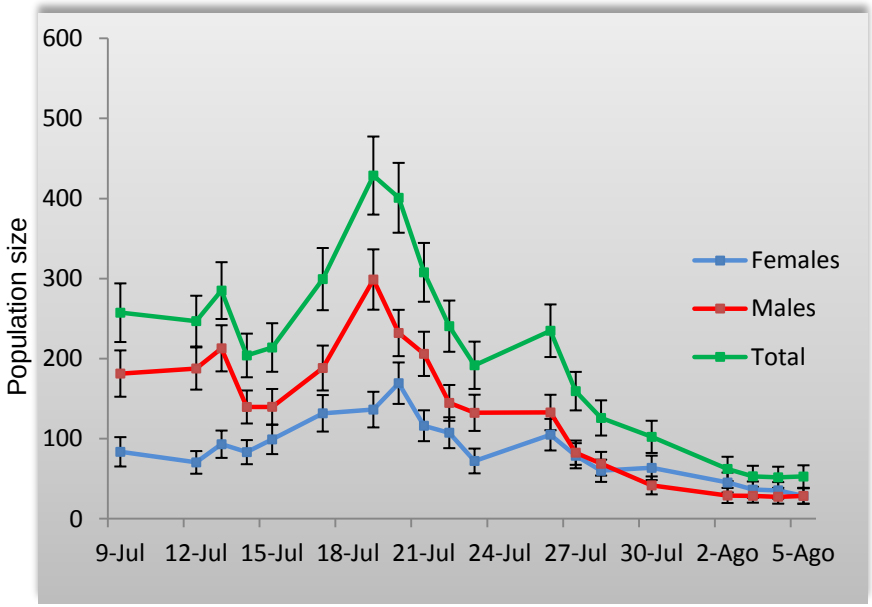
RESULTS: Demographic parameters

Year	Capture probability mean (s.e)			Recruitment (mean ±s.e)			Survival rate mean (s.e)			Population size (mean ±s.e)		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
2010	0,25 (0,02)	0,25 (0,03)	0,24 (0,02)	47,01 (13,58)	29,67 (10,16)	81,82 (21,01)	0,60 (0,02)	0,63 (0,03)	0,56 (0,02)	131,72 (51,40)	85,03 (39,11)	206,21 (73,89)
2011	0,32 (0,02)	0,37 (0,03)	0,31 (0,02)	42,25 (10,20)	42,55 (11,51)	84,73 (17,60)	0,58 (0,02)	0,63 (0,04)	0,53 (0,01)	104,81 (33,51)	105,95 (38,41)	184,73 (52,10)

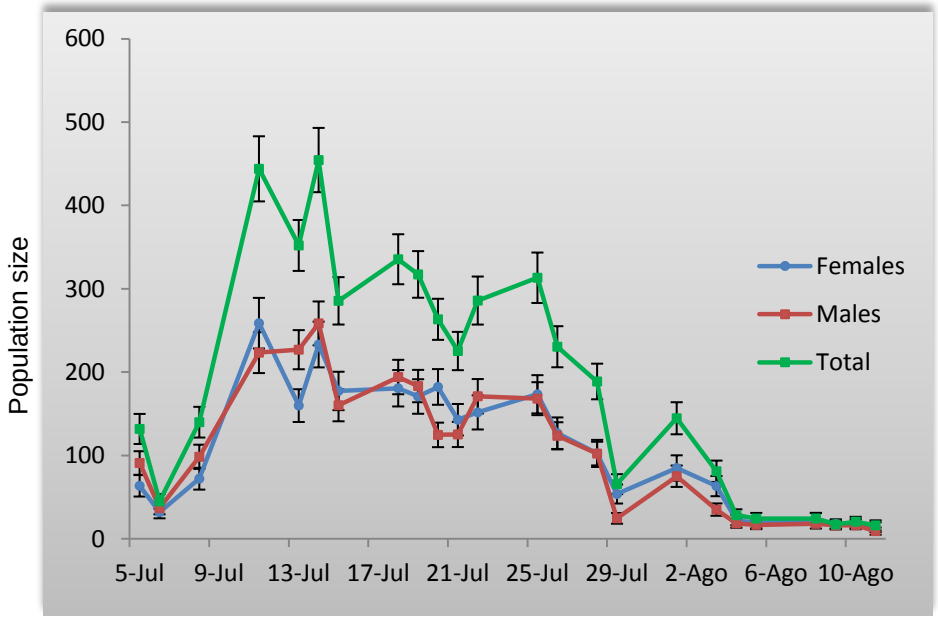
Jolly-Seber model for open populations (Model D: with both survival rate and capture probability assumed constant per unit time.

RESULTS: Daily population size

Estimates of the daily population size during the flight period for the main study area in 2010 and 2011



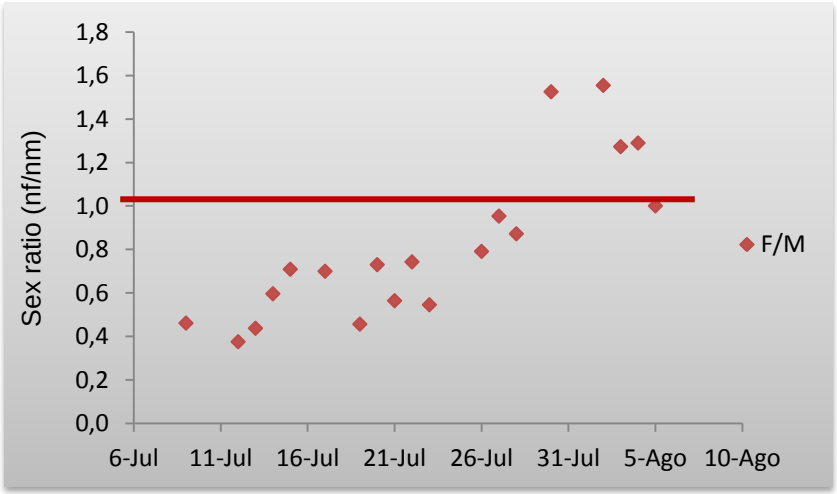
2010



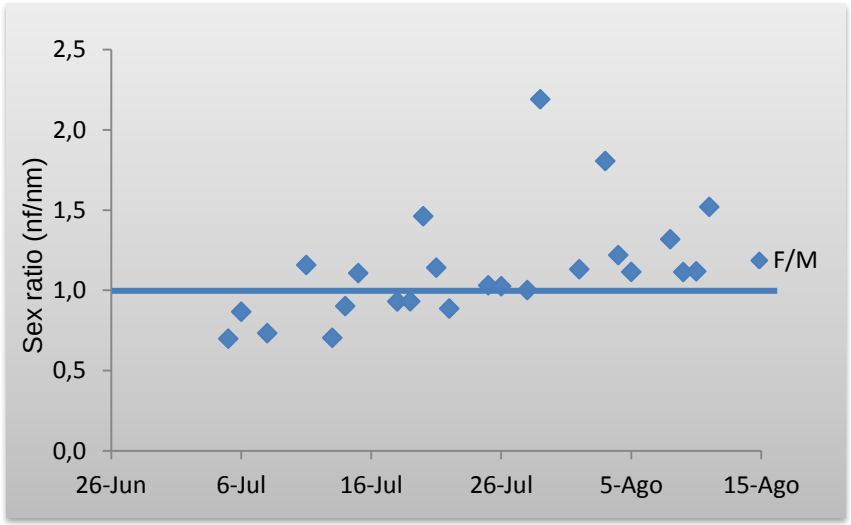
2011

RESULTS: Sex ratio

Sex ratio (females/males). Based on population size estimation in 2010 and 2011



2010



2011

Males biased at the begining to females biased at the end of the flight season, however ….

In 2011, oviposition preferences and caterpillar survival of the phytophagous phase were studied

- 127 labelled gentian shoots
- 837 eggs over the entire flight period (apical and non-apical flower buds).
- Three oviposition periods were considered (eggs produced by the early flyers, medium flyers and later ones)

Some results

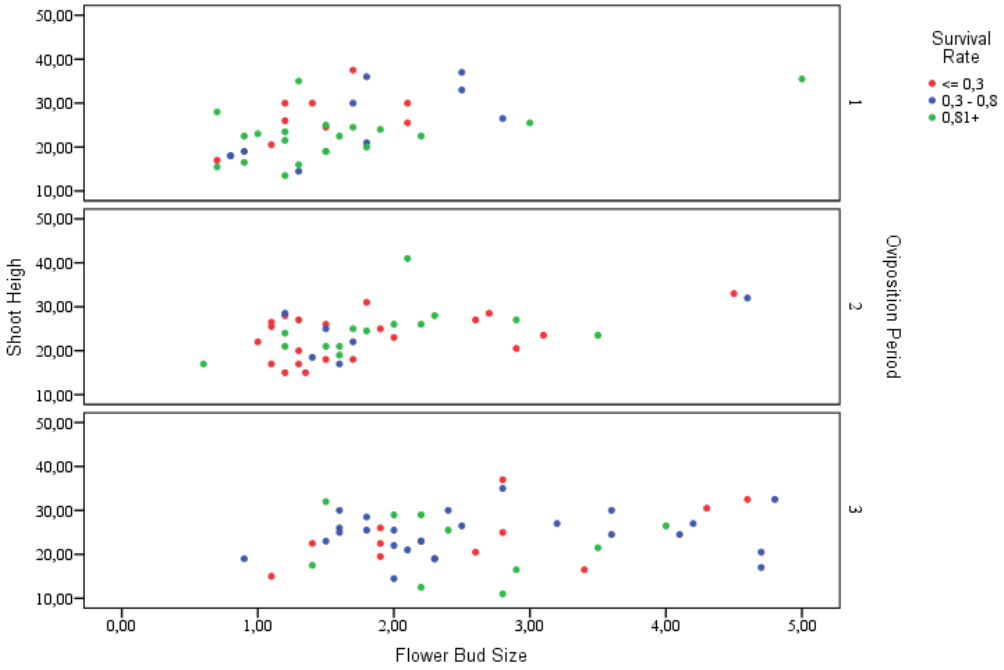
- ✓ no significant differences of the shoot height
- ✓ bigger flower buds on later flight period
- ✓ Higher number of eggs on the early period
- ✓ Preference by the green/undeveloped flower buds
- ✓ Flower bud apical preference on the second and third flight period – surrounding vegetation competition?)

Results: Caterpillar survival

Caterpillar survival were analyzed only on eggs deposited on apical flower buds.

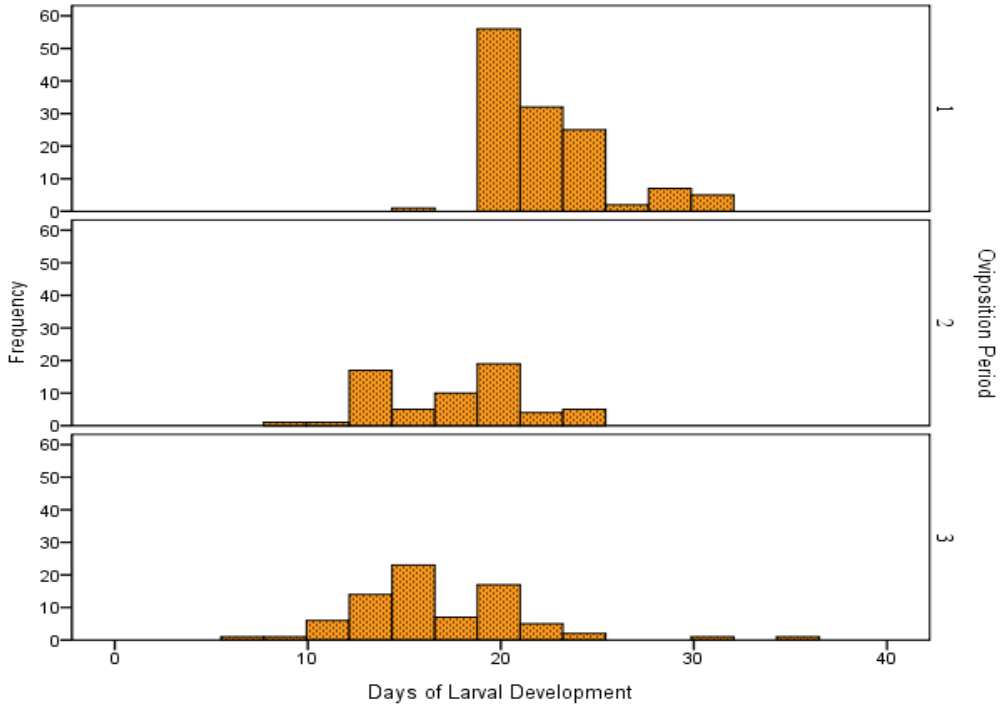
From the total number of **512 eggs** oviposited on the apical flower buds (195 in the early oviposition period, 136 in the second and 181 in the later period) only **55.5%** of the caterpillars survived.

The survival rate of the caterpillars **was higher from eggs that were oviposited earlier in the season** (χ^2=14.46, df=2, p=0.001) that showed 65.6% of survival against 45.6% in the second period and 51.9% in the later one.



Results: Caterpillar development

- ✓ 284 caterpillars reached the fourth instar
- ✓ Caterpillar size showed no differences between oviposition periods
- ✓ The number of days of caterpillar development varied between periods



- ✓ Comparing the three oviposition periods, results showed significant differences between periods (χ^2=129.643, df=2, p=0.000) with a decreasing number of days needed by the caterpillar to complete larval development across oviposition periods

Aknowledgments

Sponsors:

Vila Real
Câmara Municipal

Selvacorg
proteger e conhecer!

Others:

ICNB
Instituto da Conservação da Natureza e da Biodiversidade

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Thank you for your attention