

Review of the Ph.D. thesis of Mgr. Zdeněk Janovský – “The role of biotic interactions in population biology of meadow plants”

Overall assessment of thesis:

This thesis deals both with how interactions with animals influences the performance of plants and how environmental variation influence the intensity of these interactions. Moreover, the thesis examines both mutualistic (plant-pollinator) and antagonistic (plant-herbivore and plant-seed predator) interactions. The topic of the thesis is very timely and important. In the last decades there has been an increasing awareness of that biotic interactions are important for individual performance, population dynamics and community context, as well as of that biotic interactions vary notoriously over space. The thesis fills contributes to fill an important gap in our knowledge by examining the environmental factors that cause differences in interaction intensities. This is important both to understand current patterns of variation and to predict how interactions will change in a changing environment.

The thesis consists of five papers and a general introduction. The defendant is the first author of all papers. One of the papers is published in PLoS ONE and the others are manuscripts. The first paper examines how the occurrence of different types of plant antagonists are influenced by the surrounding environment. The second paper examines the factors contributing to spatial variation in pollinator availability. The third paper examines the effects of herbivory on plant demography. The fourth paper examines correlations between temporal allocation of reproductive effort and long-term fitness. The last paper investigates the factors influencing reproductive success in two *Achillea* species. Together the five chapters of the thesis provide evidence of that the defendant master a broad range of topics, field methods and analytical tools. In addition, the thesis summary provides a thorough and valuable review of our current knowledge of how plant-animal interactions depend on variation in the biotic environment.

Questions to the defendant:

(1) In your thesis, you discuss quite a lot about the ecological (e.g. interactions “shaping the niche”) and methodological implications of your findings. What do you think are the most important evolutionary implications of your results, linking environmental factors and intensity of mutualistic and antagonistic interactions?

(2) Throughout your thesis you use vegetation as a proxy for the abiotic environment. Do you think that there are any limitations of this approach compared with a direct assessments of effects of abiotic factors; with regards to identifying effects as well as with regards to the possibility of making predictions?

(3) Many previous studies have documented differences in the effects of animals on plant performance among populations as well as trait-related differences among individuals within

populations. In your thesis, you emphasize environmentally driven differences in the outcome of interactions among “subpopulations” within populations. What do you think are the most important implications of variation at this scale?

(4) You state in your thesis that population level metrics such as λ does not allow direct assessments of effects of herbivory and environment because most of the variation in interaction intensity occurs among individuals within populations (p. 81). Why is that? In what way did your approach circumvent these problems?

(5) You argue that the non-linear selection for inflorescence size was the result of the opposing selection from pollinators and seed predators, and this could not be detected in one- or two-year studies. Why is not the observed non-linear response of the seed predator to inflorescence size in single years sufficient to predict this?

(6) For examinations of selection on flowering strategies, can you see any problems with using only natural variation?

(7) Why did you chose not to use “standard” selection analyses (sensu Lande and Arnold 1983)? How do you think the interpretation of your results is influenced by the method you used?

Recommendation:

Based on my reading of the thesis I judge that the thesis is suitable for the defense and that its quality fulfills the criteria necessary for obtaining a Ph.D.-degree.

Johan Ehrlén,
Professor Plant Ecology
Dept. of Ecology, Environment and Plant Sciences
Stockholm University
SE 10691 Stockholm
Sweden
Email: johan.ehrlen@su.se
Phone: + 46 8 161202