Factors and processes shaping seed dispersal strategies in an annual heterocarpic plant

Efrat Dener

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Dispersal is a key life-history trait in the life cycle of plants, which has major consequences for plants fitness. While the costs and benefits of dispersal have been thoroughly investigated from a theoretical perspective, empirical investigations of these theories seem to be mostly focused on only one aspect of dispersal – dispersal rates – while other dispersal-related traits, such as dispersal distances, have gotten much less attention. In my PhD I studied how various evolutionary and ecological processes shape seed dispersal strategies in plants, focusing on the effects of pollen-source and habitat fragmentation. I studied the effects of habitat fragmentation on dispersal by measuring the dispersal potential of seeds from patches of various sizes and isolation levels in a fragmented landscape. To clear environmental effects and to assess heritability levels of dispersal-related traits, I grew two additional generations under common-garden conditions. I found mixed evidence for the effects of fragmentation on dispersal-related traits, depending on the specific trait measured, both in the field and in the net-house. To study the effects of relatedness between parent-plants on dispersal I crossed plants from increasing geographical distances in two common-garden experiments, focusing on two spatial scales. I found that distance is negatively correlated with the dispersal potential of the produced seeds when working at fine spatial scales. Lastly, I am currently constructing an individual-based spatially explicit simulation model to look at long-term dynamics and potential feedback loops between the population's spatial genetic structure and relatedness-dependent dispersal strategies. The results of my work suggest that like dispersal rates, traits that can potentially affect dispersal distances of plants, are affected by dispersal-related and other selection pressures. However, these effects, at least under natural conditions, are complex and thus will not necessarily translate to unidirectional effects on seed dispersal distances.

efratde@gmail.com