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Bird-mediated selection on fruit display traits in *Celtis ehrenbergiana* (Cannabaceae)

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ABSTRACT

Background: In mutualistic interactions of fleshy-fruited plants and seed-dispersing birds, dispersers act as natural selection agents on fruit display traits. Bird-mediated phenotypic selection on maternal and seed level plant traits has been postulated to be uncoupled. However, this key step in the understanding of the co-evolutionary processes has seldom been explored.

Goals: To study the pattern and strength of phenotypic selection exerted by birds on two different plant life stages: maternal (mean and within-plant variation of fruit traits) and offspring (individual seed size) levels.

Organism: The one-seeded fleshy-fruited tree, *Celtis ehrenbergiana* (Klotzsch) Liebm.

Field site: Natural forests of the Biosphere Reserve 'Parque Costero del Sur', near the shore of the Río de La Plata, Buenos Aires, Argentina.

Methods: We sampled 24 randomly selected trees. For each focal tree, we recorded bird visits and behaviour, and fruit-related traits. Dispersed seeds were collected at the same location.

Results: At the maternal level, birds exerted positive directional selection on mean sugar concentration. Sub-individual variation in fruit traits was not observed to be a target of bird-mediated selection. At the individual seed level, birds exerted positive directional selection on seed size.

Conclusions: While birds exert selection pressures on reward-related traits, plants obtain an advantage through a larger seed size.

Keywords: co-evolution, maternal and offspring levels, mutualism, natural selection, phenotypic selection, plant–animal interactions, seed dispersal, selection gradients.

INTRODUCTION

In plant–animal interactions, seed dispersers play a key role in the ecology and evolution of plant populations. On the one hand, patterns of animal behaviour strongly affect post fruit display plant life stages (Schupp, 1995; Jordano, 2000; Schupp *et al*., 2002; Russo *et al*., 2006); on the

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