Oikos

OIK-01268

Lázaro, A., Lundgren, R. and Totland, Ø. 2014 Experimental reduction of pollinator visitation modifies plant-plant interactions for pollination. – Oikos doi: 10.1111/oik-01268

Appendix 1

Effects of the experiment on total visitation and behaviour and composition of pollinators

Methods

Data collection: insect visitation

In order to study the potential effects that our experimental set up could have on composition and behaviour of pollinating insects, during the observation periods (see main text for their description), we also recorded the identity of visitors, categorising each visitor into the following groups: bumblebees (*Bombus* spp.), solitary bees (mainly Andrenidae, Anthophoridae, Halictidae and Colletidae) honeybees (*Apis mellifera*), ants (Formicidae), wasps (Icneumonidae, *Vespula* spp.) hover flies (Syrphidae), muscoid flies (mainly Muscidae, Anthomyiidae), beetles (Coleoptera), butterflies (Lepidoptera) and beeflies (*Bombylius minor*). In addition, for each individual visitor we recorded the number of flowers that contacted per visit to a plot and the time spent in a plot.

Statistical analyses

Prior to the study of the effects of our experiment on visitation, pollen limitation and seed set, we used generalized mixed models to examine how the experiment (experimental vs control plots) affected insect total visitation per 20-min in the communities (visitation to all the species in the community), the behaviour (number of visited flowers per individual insect, and duration of individual visits to a plot) and composition of pollinators for each of the six focal species. In the models of total visitation we used the pair of plots as a random factor. Because the focal species did

not always occur in both plots within a 'pair', the pair of plots could not be included as a random factor in the models conducted for each plant species separately. Instead, we included the individual plots (nested within the particular treatment) as a random factor in these models. For the study of the total number of visits and the number of visited flowers per individual, we used Poisson distribution and log link function (R 2.12.2; function lmer; library lme4), whereas for the study of time per plot we used normal distribution and identity as link function (R 2.12.2; function lme; library nlme). The composition of pollinators inside and outside the experimental plots was analyzed with multinomial distribution and generalized logit as link function (SAS ver. 9.2; GLIMMIX procedure).

Results

Effects of the experiment on total visitation and behaviour and composition of pollinators.

Considering all the plant species in the community, the experiment reduced insect visitation per 20-minutes in Ryghsetra (28.37 ± 0.42 vs 15.74 ± 0.21 for controls and experimental plots respectively; $z = -9.03$; $p < 0.0001$) and Finse (16.95 ± 0.14 vs 7.00 ± 0.05 for controls and experimental plots respectively; $z = -9.60$; $p < 0.0001$); Table 1 shows the reduction in visits (%) for each focal species. However our experiment did not modify the number of flowers contacted per individual visitor, or the duration of individual visits, when visited any of the focal species (Supplementary material Appendix 1 Table A1). The composition of insects visiting the study species inside and outside the plots did not differ either, except for *Centaurea* and *Astragalus* (Supplementary material Appendix 1 Table A1). In these two species, the reduction of the visits of the main pollinator (bumblebees) inside the experimental plots was associated with a relative increase in the number of fly visits. The percentage of visits to *Centaurea* conducted by bumblebees and flies was: 82.8% and 6.0% respectively, in the controls, and: 72.2% and 17.9% respectively, inside the experimental plots. The percentage of visits to *Astragalus* conducted by bumblebees and

flies was: 41.3% and 33.3% respectively, in the controls, and: 24.6% and 52.4% respectively, inside the experimental plots.