

# Experimental pollinator decline affects plant reproduction and is mediated by plant mating system

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The majority of plant species are dependent on animal pollination and many of them experience pollen limitation on their reproductive success. Pollinator decline is caused by many factors, such as degradation of natural and semi-natural habitats, climate change, and changes in plant and pollinator distributions. These threats may all disrupt plant-pollinator interactions, leading to pollinator and ultimately pollen limitation, with potential large effects on plant population dynamics and plant community composition.

We used an experimental approach where we partially reduced pollinator availability to an entire plant community to more realistically simulate potential effects of pollinator decline on plant fecundity. This enabled us to study whether a reduction in flower visitation affected the reproductive success in 19 plant species in a species rich hay meadow in south Norway. We also examined if the magnitude of reduction in fecundity in the study species is related to the reduction in pollinator visitation rate, to their dependence on pollinators for fertilization and to their attractiveness on pollinators. We simulated a decline in pollinator visitation by using dome-shaped cages covered with fishnet (experimental plots) that effectively reduced flower visitation rates compared to control plots. This enabled us to estimate the reduction in visitation rates, fertilization rates and seed weight as the difference between the values obtained in experimental versus control plots.



*The meadow at Ryghsetra with the some experimental plots and less visible control plots*

We found that the visitation rate of 15 of the 19 species was lower in the experimental plots and only three of the 15 species showed significantly reduced fertilization rates. The magnitude of reduction in fertilization rate was positively related to the degree of pollinator dependence, but not to the attractiveness of plant species on pollinators or to the reduction in visitation rate. Seed weight was not affected by the experiment. The lack of an overall effect of reduced pollinator visitation on fertilization rate suggests that some species may be robust to a pollinator decline that could increase pollen limitation on plant reproduction. Our results suggest that species with greater pollinator dependence are more vulnerable to pollinator loss.