

Grazers and pollinators shape plant evolution

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It has long been known that the characteristics of many plants with wide ranges can vary geographically, depending on differences in climate. But changes in grazing pressure and pollination can also affect the genetic composition of natural plant populations, according to a new study.

Researchers at Uppsala University and Stockholm University are presenting the new study this week in the journal *Proceedings of the National Academy of Sciences, PNAS*.

It is known that a prominent floral display increases attractiveness to [pollinators](#), but also increases the risk of damage from grazing animals and seed-eating insects. To investigate how pollinators and grazing animals affect the characteristics of natural plant populations, these researchers studied bird's eye primrose populations in alvar grasslands on the Baltic island of Öland. Two distinct morphs of primrose occur there: a short morph that produces its flowers close to the ground and a tall morph that displays its flowers well above the ground. The tall morph is better at attracting pollinators, but, on the other hand, it is more frequently damaged by [grazing animals](#) and seed predators.

In [field experiments](#) the scientists have shown that grazing pressure and pollination intensity determine whether the short or the tall primrose morph reproduces more successfully. The difference in plant height has a genetic basis, and over time differences in reproductive success affect the [genetic composition](#) of plant populations. For a period of eight years, the researchers documented changes in the proportion of short plants in natural populations and field experiments. The results show that altered

grazing pressure leads to rapid changes in the genetic composition of the primrose populations, specifically in the proportion of short plants.

The Agricultural Landscape of Southern Öland has been a World Heritage Site since 2000. The grazing pressure on the alvar grasslands of Öland has increased dramatically in the last fifteen years as a result of measures taken to keep the landscape open.

"The study shows that grazing pressure impacts not only which plants dominate but also the genetic composition of the plant populations. These findings help us understand how differences in environmental conditions influence the evolution of genetic differentiation among [plant populations](#)," says Professor Jon Ågren at the Evolutionary Biology Centre.

More information: Mutualists and antagonists drive among-population variation in selection and evolution of floral display in a perennial herb, www.pnas.org/cgi/doi/10.1073/pnas.1301421110

Provided by Uppsala University

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