

# How can flowers of the same plant species be different?

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The most diverse group of flowering plants is the hermaphroditic, flowers with both masculine and feminine organs. In hermaphroditic flowers, reproduction through self-fertilization (selfing) and cross-fertilization with other individuals (outcrossing) is possible. In outcrossing plants a pollinator agent (often pollinating animals but also wind or water) needs to disperse the pollen between individuals. Those plants have bright and big flowers to attract pollinators, often offering rewards as nectar or odor. In contrast, selfing plants have smaller and less showy flowers. On the other hand, spatial separation between the reproductive organs, i.e. herkogamy, also promotes outcrossing. Lack of herkogamy has been noticed as the most important character for selfing plants.

These two different mating systems have different consequences at the genetic level. For instance, reproduction by outcrossing increases genetic diversity contrary to selfing. When reproduction by selfing is predominant, it increases homozygosity and deleterious mutations can be revealed which can affect negatively the survival of the offspring. However, despite the negative effects of selfing, several species have evolved from outcrossing to selfing. This has been explained due to lack of pollinators or low mate availability in certain environments where reproduction by selfing can result more advantageous.

Populations of the same plant species often reproduce either by outcrossing or selfing. My interest was to study how floral traits can mirror different reproductive strategies. To accomplish this goal, I chose eight populations from different geographic areas of the herb *Arabis alpina*. I analysed how variable was the ability of reproduction (seed production) through outcrossing and selfing and whether this variation was related to differences in floral architecture. Conducting a greenhouse experiment at the Evolutionary and Biology Centre of the University of Uppsala, I analysed the seed production of four Scandinavian, two Spanish and two French population of *A. alpina*. I conducted three mating treatments, outcrossing (pollination with pollen from another plant of the same population), geitonogamy (pollen from another flower of the same plant) and selfing (flowers not manipulated allowed to self pollinate without aid).

The results indicate no differences in seed production among hand pollinated flowers with outcrossed and selfed pollen in any population. In contrast, there was variation among population in seed production by the autogamous self-pollination in un-manipulated flowers. The Scandinavian populations were better selfers than the French and Spanish populations. This is an indication of mating system differentiation among geographical areas. I analysed the differences in herkogamy among populations and I found out that the Scandinavian populations had low spatial separation between the reproductive organs in comparison to the other populations. Moreover, I analysed the time that the flowers were available for pollination and I discovered that the reproductive organs were synchronized in their maturation time. This means, that this species have the potential to reproduce either by selfing or outcrossing but the characteristic that mediates these two reproductive alternatives is herkogamy.

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