FLORAL SIGNALING VARIATION IN SELF-COMPATIBLE AND SELF-INCOMPATIBLE POPULATIONS OF *Arabidopsis lyrata*

Kaberi Singha

Most flowering plant species have both male (anther) and female (ovary/stigma) reproductive parts within the same flower. Most plants are self-incompatible (cannot be fertilized by its own pollen grains) thus arising the need to attract pollinators (e.g. insects, hummingbirds) to transfer pollens between plants. Flowers display traits such as colour, size, shape, and scent to attract the pollinators. In some plants the self-incompatibility system has broken down, and ovules can be fertilized by pollens from the same plant individual. Plants that can self-fertilize are likely not under the pressure to attract as many pollinators as outcrossers and thus do not need to advertise to the same extent. In the evolutionary time scale, changes from being self-incompatible to become self-compatible is of common occurrence. Such transitions are often accompanied by a characteristic set of morphological and functional changes in flowers such as reduction in size and colour of petals, reduced scent, nectar etc. This phenomenon is termed the *selfing syndrome*.

Arabidopsis lyrata (Brassicaceae) is a self-incompatible perennial herb found across Northern Europe, Asia and North America bearing four-lobed, small, white, scented flowers. Some local populations in the Great Lakes area (North America) have mutated and become self-compatible. I worked on four populations of *A. lyrata* from Europe (Sweden) and seven populations from the Great Lakes area to study whether the change in mating system has been accompanied by the selfing syndrome and also the covariation between floral signals. Plants from the two regions were grown together in a greenhouse. Pollination experiments were performed to assess which populations consisted of plants that could self-fertilize. Then, I measured flower diameter, petal width, floral scent emission and several other detailed measurements of the size and orientation of different parts of the flower that may change with the selfing syndrome.

Three populations from the Great Lakes area were self-compatible. Variation in floral traits was significant between Swedish and Great Lakes populations. Within the populations of Great lakes (between the two mating system), variation was found in flower diameter, petal width and floral scent except herkogamy and angle orientation. This variation was almost exclusively explained by one self-compatible population that showed a significant reduced floral scent emission and considerable smaller flower size. Our result contrasted with the clear cut pattern of reduced signaling documented in other selfing species or populations. Correlation between flower size and floral scent was negative across the two regions but significantly positive within the Great Lakes population, thus implying no general constraint on evolution of floral signals. In future, the one self-compatible population with reduced signaling would be an interesting target to study evolution of floral signals after the breakdown of the self-incompatibility system.

Degree project in biology, Master of science (2 years), 2015
Examensarbete i biologi 45 hp till masterexamen, 2015
Biology Education Centre and Department of Plant Ecology and Evolution, Uppsala University
Supervisor: Magne Friberg