

Enlarging Flower Display Vital for Cross-fertilized Alpine Herb

Primula tibetica is an inconspicuous herb distributed in the Himalayas where lacks pollinators. The species may undergo severe pollen limitation in the field, and makes an ideal model system for studying whether pollen limitation selects on the traits that increase the floral display in a case in which a small, inconspicuous plant undergoes obligate out-crossing and faces difficulty in evolving self-fertilization.

Scientists from Xishuangbanna Tropical Botanical Garden (XTBG), Chinese Academy of Sciences have conducted research to see whether the small distylous herb increases its female fitness by increasing its floral display. They asked what the incompatibility feature of *Primula tibetica* was and how pollinator-mediated selection on *Primula tibetica* occurred.

In the selection analysis, the researchers included the date at which flowering began and four morphological traits (stalk height, flower number, corolla width, and flower tube length). They considered the female fitness as the dependent variable. They also conducted a hand-pollination experiment with four treatments: hand self-fertilization, autonomous self-fertilization, hand intra-morph pollination, and hand inter-morph pollination.

During the 2016 flowering season, the researchers found significantly positive selection gradients for traits involved in the floral display (corolla width, flower number, and stalk height) in the focal population. Suffering from severe pollen limitation during the 2016 flowering season, *Primula tibetica* was demonstrated to be highly self- and intra-morph incompatible and was unable to autonomously self-fertilize. The results indicated that these plants highly relied on pollinators



(a) Flowering plants of the long-styled morph of *Primula tibetica*, (b) a flower of *Primula tibetica* being visited by a tachinid fly, (c) a flower of *Primula tibetica* being visited by a syrphid fly. Credit: JIANG Xianfeng

for sexual reproduction, and the traits involved in the floral display of *P. tibetica* were positively selected by pollinators.

The researchers concluded that *P. tibetica* was under selective pressure to increase its floral display. Enlarging the flower display may be vital for the inconspicuous distylous plant.

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