PB-6

Advances of Self-incompatibility Genetics in Genus *Fagopyrum*

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[Abstract]
Heterostyly continues to fascinate evolutionary biologists interested in heredity, evolution, breeding, and adaptive function. Polymorphism demonstrates how simply inherited developmental changes in the location of plant sexual associations can have important consequences for population pollination and mating biology. In contrast to homozygous self-incompatibility, only a small number of mating phenotypes can be maintained in the population because insect pollinators have limitations in achieving multiple segregation sites for pollen deposition.
Field studies of pollen tube growth have shown that reciprocal style-stamen polymorphisms function to increase the capacity of insect-mediated cross-pollination. The genetic pattern of style morphs is well established in various taxa, but despite recent advances, the identity, number, and structure of the genes controlling the heteromorphic syndrome have been poorly elucidated. The phenomenon of heterostyly in buckwheat has been controlled by gene complex concentrate to *S*-locus. Homomorphic autogamous buckwheat strains were established by the interspecific hybridization. Backcrossing of this line to the common buckwheat (pin) and selecting homostylar progenies made it possible to introduce the self-compatible gene into common buckwheat. In the result, we obtained the BC_9F_2 generation, and defined the strong linkage between flower type and self-incompatibility by microscopic observation of pollen tube growth. This finding suggests that self-incompatibility character is not controlled by one gene. Moreover, we defined the strong linkage between flower type and self-incompatibility. It strongly supports the S supergene theory. Therefore, we have plan to elucidate the heterostyly self-incompatibility by using molecular genetics, proteome analysis and apply to exploitation of buckwheat improvement. In near future, the expression of heterozygous syndromes in genus *Fagopyrum* with single isolated heterozygous species may provide clues to early stages of polymorphic assembly and shed light on evolutionary models of heterozygous strains.

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