

Development of Homomorphic Autogamous Buckwheat lines by Introgressive Hybridization

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Objectives

In this study, introgressive hybridization, backcrossing of this line to the common buckwheat (pin) and selecting homostylar progenies was carried out to establish of homomorphic autogamous buckwheat. We examined the relationship between homomorphic flower and self-incompatibility by using these progenies.

Material and Methods

Plant materials: Self-compatibility could be determined 5 days after flowering through the observation of developing embryos (Woo et al. 1995; Woo et al. 1997; Woo and Adachi 1997, Woo et al. 1998; Woo et al. 1999; Woo et al. 2001).

Self-pollination and backcrossing: Crossing was done by following manual cross-pollination in the morning when flowers were in full blossom. Backcrossing was carried out by using common buckwheat (pin), as female plant and BC₆F₁ generation, as male plant.

Pollen tube growth analysis: Self-pollinated flower of BC₆F₁ generation was fixed by fixative (95% ethanol : acetic acid = 3:1) at 6 hours after pollination. The observation was enforced by 10 samples over a plant. Style was separated into 5 stages, and pollen tube growth was observed along the stages.

Results and Discussion

Breeding of common buckwheat (*Fagopyrum esculentum*) is not proceeded well because of allogamy, although it has been cultivated for a long time. Recently, 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 BC₆F₁ generation, and defined the strong linkage between flower type and self-incompatibility by microscopic observation of pollen tube elongation.

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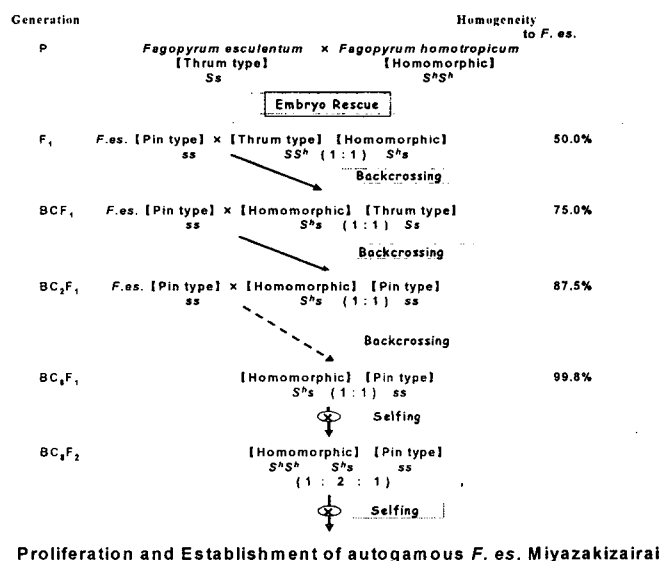


Figure 1. Scheme of genetic analysis and details of introgressive hybridization

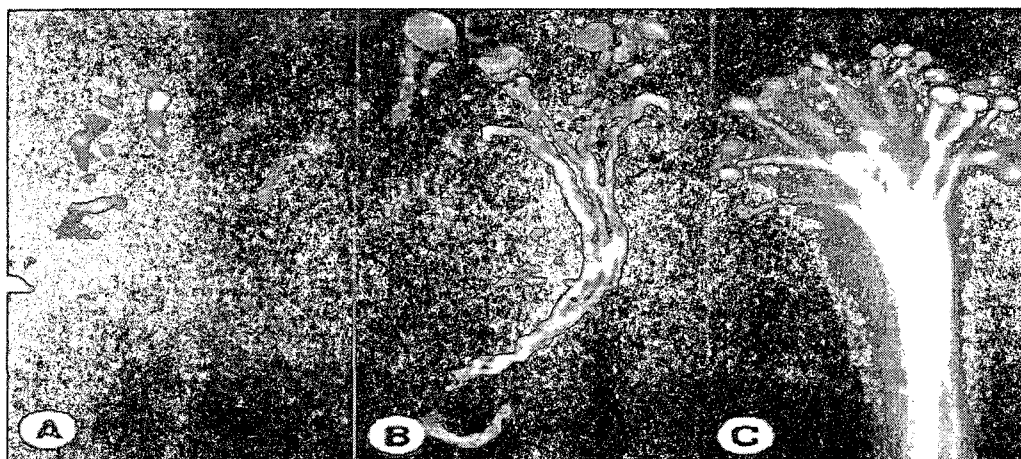


Figure 2. Pollen tube growth at 6h after pollination in BC₆F₁ generation. A: Pollen tubes stop at stigma; B: Pollen tubes stop at style; C: Pollen tube penetrate at stylopodium.

Table 1. Pollen tube elongation in BC₆F₁ generation

Flower type	No. of plant	No. of observation	Measures for pollen tube elongation					Pollen tube penetrate at stylopodium (%)
			1	2	3	4	5	
Homomorphic	73	1219	2	1	19	44	1155	94.2
Pin	66	863	13	74	757	18	0	0