

자식성메밀품종개발

1. 메밀속에 있어서 종간교잡 가능성

일본미야자키대학 농학부 : 우선화* 아다찌다이치

충북대학교 농과대학 : 정승근, 박상일, 손석용

Breeding of a new selfing buckwheat

1. Possibility of interspecific hybridization among some species in the genus *Fagopyrum*.

Miyazaki University : S.H.Woo and T.Adachi*

Chungbuk National University : S.K.Jong., S.I.Park and S.Y.Son

Objectives:

Using fluorescent microscopy and Nomarski's interference microscopy, pollen tube growth, embryo and endosperm deterioration after interspecific pollination were observed to study interspecific cross-incompatibility in the genus *Fagopyrum*.

Materials and Methods

Five different genotypes were used, in the genus *Fagopyrum*. The species of *F. esculentum*, *F. tataricum*, *F. cymosum*, *F. homotropicum* and *F. giganteum* were obtained from commercial growers. The species used are diploid ($2n=16$), and *F. esculentum*, *F. cymosum* and *F. giganteum*, which are tetraploid ($2n=32$). The flowers were emasculated about one days before anthesis under a magnifying glass. The pollinated flowers were detached and fixed at 1, 6 and 24hr after pollination (HAP) by carnoi's fixative. Both fresh and previously fixed pistils were dissected out under stereo microscope. After rinsing in 1N NaOH at room temperature for 1 hr or more within 24 hr, the softened pistils were stained in 0.1% aniline blue solution and UV-fluorescence(Kho and Baer 1968). Style length and pollen tubes length were measured with a micrometer, and the length of the longest pollen tube in each pistil was recored. The pollinated flowers were collected at 2, 3 or 5 days after pollination, and placed into fixative (BB-4 1/2) solution at 4°C in the refrigerator After 24 hr of treatment with BB, transparent samples were observed by Nomarski's interference microscopy.

Results and Discussion

The frequency of pollen tube penetration into micropyle and the place of pollen tube inhibition in pistils at 24 hr after pollination were used as criterion for reflecting the different degrees of compatibility and incompatibility in interspecific crosses and the possibility of fertilization (Table 1). Thus the combinations could be classified into 2 groups (compatible and incompatible) and 5 degrees from high compatible to complete incompatible as shown in Table 2. The cross-compatible combinations can be subdivided into the highly compatible and slightly compatible. In the former, the pollen tube micropylar penetration was observed over more than 50% of pollinated pistils.

Table 2. The classification of inter specific cross-combination.

- I. Highly compatible
 - F. esculentum* × *F. cymosum*
 - F. esculentum* × *F. homotropicum*
 - F. esculentum* × *F. giganteum*
- II. Slightly compatible
 - F. cymosum* (thrum) × *F. esculentum* (pin)
 - F. cymosum* (4x, pin) × *F. esculentum* (thrum)
 - F. homotropicum* × *F. esculentum* (2x, pin)
 - F. tataricum* × *F. esculentum* (pin)
- III. Pollen tube inhibited at stigma
 - F. esculentum* (thrum) × *F. tataricum*
 - F. homotropicum* × *F. esculentum* (thrum)
 - F. tataricum* × *F. esculentum* (thrum)
- IV. Pollen tube inhibited in style
 - F. esculentum* (pin) × *F. tataricum*
 - F. esculentum* (pin) × *F. giganteum* (pin)
 - F. giganteum* × *F. esculentum* (pin)
- V. Pollen tube inhibited at stylodium
 - F. giganteum* × *F. esculentum* (thrum)
 - F. cymosum* (pin) × *F. esculentum* (thrum)
 - F. esculentum* (pin) × *F. homotropicum*
 - F. homotropicum* × *F. esculentum* (4x, pin)

Table 1. Frequency of pollen tube penetration into micropyle at 24 hours after pollination (HAP).

Pollen Pistil	E2X		E4X		H	T	G
	P	Th	P	Th			
E2X	P	(10/10) 100.0	(0/10) SD	(0/10) SL	(0/8) SL	(0/10) SL	(0/10) SL
	Th*	(10/10) 100.0	(6/9) 66.7	(0/10) SM	(0/10) SM	(0/10) SM	(0/10) SM
E4X	P	(10/10) 100.0	(10/10) 100.0	(0/10) SD	(0/10) SL	(0/10) SL	(0/10) SL
	Th	(10/10) 100.0	(6/10) 60.0	(0/10) SM	(0/10) SM	(0/10) SM	(0/10) SM
H	P	(2/10) 20.0	(0/10) SM	(0/10) SD	(10/10) SM	(10/10) SM	(10/10) SM
	Th	(3/10) 30.0	(0/8) SM	(4/13) 30.8	(0/10) SM	(10/10) SM	(10/10) SM
T	P	(0/10) SL	(0/10) SD	(0/10) SL	(0/10) SD	(0/10) SL	(0/10) SL
	Th	(0/10) SL	(0/10) SD	(0/10) SL	(0/10) SD	(0/10) SL	(0/10) SD
G	P	(8/10) 80.0	(8/10) 80.0	(10/12) 83.0	(10/12) 83.3	(10/12) 83.3	(10/12) 83.3
	Th	(8/10) 80.0	(2/9) 22.2	(10/12) 83.0	(9/25) 36.0	(4/15) 26.7	(7/13) 53.8
C2X	P	(8/10) 80.0	(8/10) 80.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0
	Th	(8/10) 80.0	(2/9) 22.2	(10/12) 83.0	(9/25) 36.0	(4/15) 26.7	(7/13) 53.8
C4X	P	(8/10) 80.0	(8/10) 80.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0
	Th	(8/10) 80.0	(2/9) 22.2	(10/12) 83.0	(9/25) 36.0	(4/15) 26.7	(7/13) 53.8
E2X	P	(9/9) 100.0	(9/9) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0
	Th	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0
E4X	P	(12/12) 100.0	(12/12) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0
	Th	(10/10) 100.0	(6/6) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0	(10/10) 100.0

Note: The data in frame represent the value of control; *, No. of pistil to which pollen tube arrived at micropyle among total number of pollinated pistils; SM, SL and SD represent the longest pollen tube stopped at stigma, style and stylodium, respectively.