



Short Communication

Pollen fertility studies in *Indica-Japonica* wide compatible rice hybrids

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The present study aims at evaluating the performance of different hybrids and segregating populations using *indica*, *japonica* subspecies and wide compatible varieties for pollen fertility.

Ten plants from the 42 *indica* × *japonica* hybrids and parents and two hundred plants from segregating populations (F₂, B₁, B₂) in each of the four selected crosses, viz., Plate Blanc MNI × Akihikari, N22 × IR 50, Lambayeque - 1 × ADT 36, Dular × Toyonishiki, were selected at random for pollen fertility studies. The spikelets from early emerging panicles were collected during early morning hours and fixed in 70% alcohol. Anthers from selected spikelets were separated, crushed and stained using 1% potassium iodide solution for observation under microscope. Total number of pollen grains, number of stained and unstained pollen grains were counted separately at 10 different fields and the total in each category was worked out. The pollen fertility was calculated by formula suggested by Chaudhary *et al.* [1]. The fertility status was classified according to IRRRI standards and Govinda Raj and Virmani [2] classification.

Among the hybrids pollen fertility ranged from 60% (Norin PL 9 × IR 50) to 96.67% (Palawan × Akihikari) (Table 1). All the hybrids were categorized into fertile group based on pollen fertility classification. In the F₂ ratio for fertile : partial sterile plants was 3:1 in all the four crosses and similarly in back cross (B₁ and B₂) the ratio of fertile: partial sterile was 1:1. (Table 2).

When *indica* WCV was crossed with *japonica* testers, all combinations recorded normal fertility indicating that either one of *japonica* or *indica* parents contained one neutral allele for pollen fertility. The *indica* WCV with *indica* testers showed comparatively lower percentage of fertility. The WCV Palawan and Plate Blanc MNI of *japonica* group exhibited highest fertility level in all cross combinations indicating their

Table 1. Pollen fertility percentage of parents and hybrids

Pollen fertility (%)	Male	Akihikari	Toyonishiki	Taichu ng 65	IR 50	ADT 36	ASD 18
Female	(T ₁)	(T ₂)	(T ₃)	(T ₄)	(T ₅)	(T ₆)	
	73.30	82.00	78.10	92.30	94.50	91.30	
BPI 76 (G) (L ₁) (<i>indica</i>)	82.00	94.11	93.10	63.00	62.00	66.67	72.98
N22 (L ₂) (<i>aus</i>)	80.20	90.24	69.70	85.92	91.84	87.87	66.67
Plate Blanc MNI (L ₃) (<i>japonica</i>)	94.50	95.00	92.00	94.00	94.00	68.00	94.87
Palawan (L ₄) (<i>japonica</i>)	78.00	96.67	92.86	92.16	90.10	94.34	85.15
Dular (L ₅) (<i>aus</i>)	85.80	93.34	91.38	65.51	82.35	68.18	94.28
Lambayeque-1 (L ₆) (<i>aus</i>)	72.00	89.47	63.58	74.08	68.09	63.63	69.57
Norin PL 9 (L ₇) (<i>japonica</i>)	77.50	95.00	90.00	61.34	60.00	68.62	86.13

Table 2. Chi square test for pollen fertility

Cross and generation	Observed value			Expected ratio Fertile:Partial sterile	X ² value
	Fertile	Partial* fertile	Partial sterile		
C ₁ -Plate Blanc MNI × Akihikari					
F ₂	142	20	38	3:1	0.10 NS
B ₁	105	14	81	1:1	2.88 NS
B ₂	102	12	86	1:1	1.28 NS
C ₂ -N22 × IR 50					
F ₂	142	18	40	3:1	0.03 NS
B ₁	98	22	80	1:1	1.62 NS
B ₂	100	16	84	1:1	1.28 NS
C ₃ -Lambayeque-1 × ADT 36					
F ₂	145	12	43	3:1	0.03NS
B ₁	106	14	80	1:1	3.38 NS
B ₂	98	20	82	1:1	1.28 NS
C ₄ -Dular × Toyonishiki					
F ₂	140	26	34	3:1	0.24 NS
B ₁	102	14	84	1:1	1.62 NS
B ₂	97	12	91	1:1	0.18 NS

*Equally divided into fertile and partial sterile to minimize the bias (Vijayakumar and Virmani, 1992); NS - Non significant

contribution of normal allele for increased fertility. The wide compatible aus group namely, N22, Dular and Lambayeque-1 showed varying degrees of fertility in their combinations with *indica* and *japonica* testers. Ikehashi *et al.*, [3] reported that Dular was an important WCV possessing S_{5n} allele for fertility. Among WCV's Plate Blanc MNI and Palawan seemed to be very good source for improving fertility level in wide compatibility crosses of japonica-indica testers. The analysis of pollen fertility of three segregating generations (F_2 , B_1 and B_2) in four crosses viz., Plate Blanc MNI \times Akihikari, N22 \times IR 50, Lambayeque - 1 \times ADT 36 and Dular \times Toyonishiki revealed that the pollen fertility was controlled by a single gene. This was in accordance with the findings of Vijayakumar and Viramni [4] and Yang Zhuping *et al.*, [5].

References

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