

## P67. Mapping of Resistant Genes to Blast (*Pyricularia grisea*) in Korean Weedy Rices (*Oryza sativa* L.)

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### Objective

To diversity the gene resources to breed rice cultivars of durable resistance to blast

### Materials and Methods

- o Susceptible lines : Nagdongbyeo and Ilpumbyeo
- o Resistance lines : Kanghwa 11 and Geumleung 33
- o Phenotyping for Korean blast isolates
  - KJ-201, KJ-301, KI-313, KI-315a, KI-409
- o Genotyping using molecular markers
  - Populations : 196 F3 lines of Nagdongbyeo/Kanghwa 11  
94 F3 lines of Ilpumbyeo/Geumleung 33
  - Molecular markers : Microsatellite, AFLP and RAPD
- o Data analysis : Mapmaker v3.0

### Results and discussion

1. The resistances to races KJ-201, KI-313 and KI-315a were controlled by single dominant gene, and to race KI-409 by two complementary genes in Geumleung33. The resistances to races KJ-301 and KI-409 in Kanghwa11 were controlled by single and two dominant genes, respectively.

2. In allelism test by the cross between Kanghwa11 and Geumleung33, the resistances to races KJ-201, KJ-301 and KI-315a were controlled by two dominant genes, and the resistance to race KI-409 was controlled by two dominant genes and two complementary genes. Thus, Geumleung33 seems to have at least one dominant gene, and this will acted as complementary gene with another gene to any specific blast race. Kanghwa11 has two different dominant genes with those of Geumleung33.

3. The resistance gene to race KJ-301 in Kanghwa11 was located near microsatellite marker RM155 (OSR32) on chromosome 12.

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Table 1. F<sub>2</sub> segregation of reactions to four Korean races of leaf blast fungus (*Pyricularia grisea*) in two crosses between susceptible *japonica* rice cultivar and resistant Korean weedy rice

Korean blast races	P <sub>1</sub>	P <sub>2</sub>	No. of F <sub>2</sub> plants			Expected ratio	$\chi^2$ b)	P
			R a)	S	Total			
Ilpumbyeo (P1)/Geumleung 33 (P2)								
KJ-201	S	R	202	69	271	3 : 1	0.031 <sup>ns</sup>	0.90-0.75
KI-313	S	R	212	51	263	3 : 1	4.412*	0.05-0.025
KI-315a	S	R	202	58	260	3 : 1	1.005 <sup>ns</sup>	0.50-0.25
KI-409	S	R	137	125	262	9 : 7	1.669 <sup>ns</sup>	0.50-0.25
Nagdongbyeo (P1)/Kangwha 11 (P2)								
KJ-301	S	R	212	81	293	3 : 1	1.093 <sup>ns</sup>	0.50-0.25
KI-409	S	R	501	37	538	15 : 1	0.361 <sup>ns</sup>	0.75-0.50

a) R : Resistant, S : Susceptible

b)  $\chi^2$  value based on expected ratio by observed numbers

ns : Not significant at 5% level, \* : Significant at 5% level

Table 2. F<sub>2</sub> segregation of reactions to four Korean races of leaf blast fungus (*Pyricularia grisea*) to test allelism relationship of blast resistant genes of two Korean weedy rices

Korean blast races	P <sub>1</sub>	P <sub>2</sub>	No. of F <sub>2</sub> plants			Expected ratio	$\chi^2$ b)	P
			R a)	S	Total			
Kangwha 11 (P1)/Geumleung 33 (P2)								
KJ-201	R	R	249	22	271	15 : 1	1.641 <sup>ns</sup>	0.25-0.10
KJ-301	R	R	280	16	296	15 : 1	0.361 <sup>ns</sup>	0.75-0.50
KI-315a	R	R	221	9	230	15 : 1	2.160 <sup>ns</sup>	0.25-0.10
KI-409	R	R	785	21	806	35.6 : 1 <sup>c)</sup>	0.050 <sup>ns</sup>	0.90-0.75

a) R : Resistant, S : Susceptible

b)  $\chi^2$  value based on expected ratio by observed numbers

c) 35.6 : 1 is expected ratio of R : S in F<sub>2</sub> population of a cross between two different resistant varieties possessing two complementary genes and two duplicate genes, respectively.

ns : Not significant at 5% level.

Table 3. Linkage analysis of resistance genes to blast race KJ-301 in F<sub>3</sub> population of Nagdongbyeo/Kanghwal1

Markers	Chr. no.	Distance (cM)
Pi-KJ-301(t)	12	6.1
RM155(OSR32)	"	52.7
RM270	"	5.6
RM235	"	8.0
RM17	"	-----
		72.4cM
5 markers log-likelihood = -334.75		