

INHERITANCE OF RESISTANCE TO *ALBUGO CANDIDA* RACE 2 IN  
MUSTARD (*B. JUNCEA* (L.) CZERN.)

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The inheritance of resistance to white rust (*Albugo candida*) race 2 in mustard was studied in two crosses involving one resistant (R-908) and two susceptible cultivars (S-906 and S-907). In the summer of 1986, the reaction of the parent genotypes was confirmed in a growth chamber and by greenhouse artificial inoculation tests. Reciprocal  $F_1$  crosses were made and the backcrosses and  $F_2$  progeny obtained in the winter/spring season of 1986/87. The parents, the reciprocals  $F_1$ ,  $F_2$  and backcrosses were grown, and their white rust reaction determined in summer 1987.

The inoculum was prepared by collecting the white rust zoosporangia from heavily infected fresh leaves of the susceptible *B. juncea* cultivar Burgonde. The zoosporangia were collected in sterile distilled water and allowed to germinate for 2 to 2.5 h at 0-4°C. A zoospore suspension, containing 25,000 or more spores/ml was sprayed on the foliage with a hand automizer until runoff. The plants were then placed in a mist chamber for 24 h. The mist chamber was located in a growth chamber in dark. The plants were removed from the mist chamber after 24 h and grown in the growth chamber for one week under 18°C and 16 h day length, after which they were transferred to the greenhouse and rated for white rust reaction two weeks after inoculation.

Susceptibility and resistance were defined as the presence or complete absence of pustules on leaves. The disease reaction of plants in the resistant and susceptible classes was very distinct. The observed class frequencies were evaluated by the  $\chi^2$  test to determine goodness of fit to mono- and dihybrid ratios.

## RESULTS

The reaction of the  $F_1$  plants from reciprocal crosses between susceptible R-907 and resistant R-908 parents was similar to that of the resistant parent. Thus, the resistance carried by R-908 is dominant and controlled by nuclear genes. All the offsprings in each of the two backcrosses to the resistant parent, i.e., (S-907  $\times$  R-908)  $\times$  R 908 and (R-908  $\times$  S-907)  $\times$  R-908, also showed the same reaction as that of the resistant parent.

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The test-cross progenies, in both backcrosses to the susceptible parent, segregated in the 1 : 1 ratio of resistant to susceptible (Table 1). The F<sub>2</sub> progenies from crosses S-907 × R-908 and S-906 × R-908 segregated in 3 : 1 ratio of resistant to susceptible plants. The  $\chi^2$  tests indicated good fit to the above ratios. The goodness of fit of a 13 : 3 ratio in the F<sub>2</sub> population was also tested and gave a poor fit. The F<sub>2</sub> data from the reciprocal cross involving parents S-907 and R-908 were tested for homogeneity and found to belong to the same population. The pooled data gave a good fit to the 3 : 1 ratio, and deviated significantly from the 13 : 3 ratio for digenic inheritance. The study revealed that resistance is monogenic and could be easily transferred to adapted susceptible genotypes by backcrossing.

Table 1. Observed segregation in *B. juncea* and  $\chi^2$  values for backcross and F<sub>2</sub> reaction to *A. candida*

Cross & pedigree	Reaction		Ratio	$\chi^2$	P
	resistant	susceptible			
BC (S-907 × R-908) × S-907	36	33	1:1	0.13	0.10–0.80
BC (R-908 × S-907) × S-907	41	31	1:1	1.39	0.20–0.30
F <sub>2</sub> (S-907 × R-908)	186	77	3:1	2.57	0.20–0.30
			13:3	19.3	< 0.01
F <sub>2</sub> (R-908 × S-907)	169	60	3:1	0.18	0.50–0.70
			13:3	8.34	< 0.01
Test for homogeneity				0.62	0.50–0.25
F <sub>2</sub> (S-907 × R-908) and reciprocal			3:1	2.12	0.25–0.10
			13:3	26.72	< 0.005
F <sub>2</sub> (R-908 × S-906)	101	30	3:1	0.19	0.50–0.70
			13:3	6.13	< 0.05