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Genetic Analysis and Allelic Relationship for White Rust (*Albugo candida*) in Indian Mustard (*Brassica juncea*).

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Abstract:- Six white rust resistant lines and two high yielding susceptible varieties namely NRCDR02 and Rohini were crossed and all the six resistant varieties were crossed in diallele mating design. All the F_1 plants were resistant for white rust and F_2 were segregated in 3:1 ratio. The crosses of diallele mating segregated in 13:3 ratio in F_2 generation.

I. INTRODUCTION

Indian mustard is major oil seed crop in india for edible oil. There are many abiotic and biotic factors affecting the growth of crop during its life cycle. Among the biotic factors, white rust is an important disease caused by *Albugo candida* reduced the yield upto 60% under favorable environment and late sown condition. All the high yielding varieties are highly susceptible to white rust. *Brassica carinata* and *Brassica napus* have resistance to white rust (Yadav and Sharma, 2006). Development of the resistant varieties for white rust

II. MATERIALS AND METHODS

The experiment conducted at Directorate of Rapeseed mustard Research, Sewar, Bharatpur during the crop season 2009-2010 and 2010-2011 in Rabi. The six white rust resistant lines NRCM-10, NRCM-21, NRCM-35, NRCM-56, NRCM-75 and NRCM-85 derived from *B.carinata* and *B.napus* were used for the crossing with two high yielding susceptible varieties (NRCD02 and Rohini). All these six resistant varieties were crossed in diallele fashion. The F_1 seed harvested and sent to wellington for generation advancement. The F_2 seed from wellington sowed at DRMR for F_2 population and agronomical practices were applied for good crop. The fresh innoculum of white rust was sprayed on leaves and extra nitrogen dose and irrigation was applied for proper development of disease. The F_1, F_2 were investigated for resistance to white rust to determine the mode of inheritance.

III. RESULTS AND DISCUSSION

The reactions of the F1 and F2 progenies to white rust investigated in 27 crosses are shown in Tables 1-3. F1 plants in all crosses of Table 1, 2 and 3 were resistant, indicating that resistance was dominant in all six varieties. From Table 1 and 2 data presented that F2 plants were segregated in 3 resistant : 1 susceptible ratio. These results indicated that resistance to white rust is governed by one dominant gene. Six white rust resistant lines were carinata and napus derived, from these results cleared that both species have single dominant gene for white rust resistance.

From Table 3, all the F_1 plants were resistance to white rust and F_2 plants presented 13 resistant : 3 susceptible ratio. These lines were resistant lines derived from *B.carinata and B.napus*.

Table: 1 Reaction to white rust in F_1 and F_2 population of crosses between six resistant lines and NRCDR02**.**

S. No.	Crosses	White rust reaction			Chi^2
		F_1 reaction	F_2 reaction		(3:1)
			Resistant	Susceptible	
1	NRCM-10 X NRCDR02	Resistant	162	53	1.17
2	NRCM-21 X NRCDR02	Resistant	172	65	1.10
3	NRCM-35 X NRCDR02	Resistant	156	49	1.79
4	NRCM-56 X NRCDR02	Resistant	159	58	2.28
5	NRCM-75 X NRCDR02	Resistant	163	62	2.39
6	NRCM-85 X NRCDR02	Resistant	156	47	2.84

P=0.05, df=1, χ^2 =3.814

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Table: 2 Reaction to white rust in F_1 and F_2 population of crosses between six resistant lines and Rohini.

S. No.	Crosses	White rust reaction			Chi^2
		F_1 reaction	F_2 reaction		(3:1)
			Resistant	Susceptible	
1	NRCM-10 X ROHINI	Resistant	149	42	2.94
2	NRCM-21 X ROHINI	Resistant	165	55	2.24
3	NRCM-35 X ROHINI	Resistant	159	49	1.28
4	NRCM-56 X ROHINI	Resistant	158	59	1.57
5	NRCM-75 X ROHINI	Resistant	172	58	3.05
6	NRCM-85 X ROHINI	Resistant	148	46	1.88

P=0.05, df=1, χ^2 =3.814

Table: 3 Reaction to white rust in F_1 and F_2 population of diallele crosses between six resistant lines.

S. No.	Crosses	White rust reaction			Chi^2
		F_1 reaction	F_2 reaction		(13:3)
			Resistant	Susceptible	
1	NRCM-10/NRCM-21	Resistant	156	23	0.043
2	NRCM-10/NRCM-35	Resistant	190	36	0.277
3	NRCM-10/NRCM-56	Resistant	179	28	0.054
4	NRCM-10/NRCM-75	Resistant	168	25	0.039
5	NRCM-10/NRCM-85	Resistant	188	31	0.081
6	NRCM-21/NRCM-35	Resistant	195	35	0.169
7	NRCM-21/NRCM-56	Resistant	205	38	0.213
8	NRCM-21/NRCM-75	Resistant	198	29	0.021
9	NRCM-21/NRCM-85	Resistant	196	36	0.207
10	NRCM-35/NRCM-56	Resistant	169	29	0.139
11	NRCM-35/NRCM-75	Resistant	189	38	0.437
12	NRCM-35/NRCM-85	Resistant	178	28	0.057
13	NRCM-56/NRCM-75	Resistant	186	34	0.210
14	NRCM-56/NRCM-85	Resistant	189	39	0.524
15	NRCM-75/NRCM-85	Resistant	192	38	0.386

P=0.05, df=1, χ^2 =3.814

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