

GENIC BEHAVIOUR OF RUST RESISTANCE IN SOME GENOTYPES OF LINSEED

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ABSTRACT

Studies on the F₂ progenies of 10 rust resistant and 9 susceptible genotypes of *Linum usitatissimum* indicated the presence of one dominant gene in all the ten resistant cultures, namely, Abyssinian, Birio, Clay, Dakota, Min. R 3083, Min. R 3115, Norman, Polk, EC 9830 and EC 41628.

Key words: *Linum usitatissimum*, rust resistance, and *Melampsora lini*.

Linseed (*Linum usitatissimum* L.) is severely affected by rust caused by *Melampsora lini* (Ehrenb.) Le'v which reduced its production and productivity substantially. Vasudeva [1] reported annual yield loss to the tune of 44%. To manage the disease, genetic resistance is the most dependable tool. Considerable work has already been done earlier in linseed [2–13]. The present investigation aims to analyse the mode of inheritance of rust resistance in a few new genotypes and confirm the earlier findings, i.e. genic behaviour of resistant cultures.

MATERIALS AND METHODS

Fifteen intervarietal crosses were tested in F₂ under laboratory conditions. The rust resistant parents involved, in the crosses were EC 9830, EC 41628, Abyssinian, Birio, Clay, Dakota, Min. R 3083, Min. R 3115, Norman and Polk. The susceptible parents were Afgan-6, BR-1, Deta, EC 421, EC 544 (W), Kangra Local, Mahoba Local, Neelum and NP (RR) 65. All the F₁ seeds were sown in rows at a spacing of 45 x 10 cm. The entire F₁ material in the field was inoculated at flowering stage to create artificial epiphytotics with the mixture of fresh uredial inoculum of all the races [14].

The F₂ plants were screened against the rust in laboratory conditions sowing 10–15 seed in one 10 cm polythene pots, with 15–25 pots in each cross. Water was sprayed on seedlings

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at two leaf stage seedlings and fresh uredial inoculum (mixture of all the races) was transferred on the wet leaves with the help of sterilized lancet needle. The pots were placed inside humidity chamber for 24h at 15–20°C, where more than 95% humidity was maintained by spraying water once or twice.

The pots were then transferred to the laboratory tables where optimum conditions were available for pathogen as well as host. Individual plant infection was recorded 15–20 days after inoculation. The resistant plants were totally free from rust pustules while the susceptible plants had one to many rust pustule.

All the races of linseed rust were maintained on susceptible varieties of linseed under spore-proof conditions.

The segregation in each cross (Table 1) was statistically analysed and fitness of ratio decided using χ^2 test [15].

Table 1. Segregation of F₂ progenies of linseed crosses for rust resistance

Cross	Parents		F ₂ plants		Ratio tested	χ^2	P value
	female	male	R	S			
Afgan-6 x EC 41628	S	R	221	88	3:1	1.993	0.20–0.10
EC 41628 x EC 421	R	S	253	79	3:1	0.256	0.70–0.50
EC 41628 x Deta	R	S	244	84	3:1	0.640	0.80–0.70
EC 544(W) x Norman	S	R	182	61	3:1	0.006	0.95–0.90
NP(RR) 65 x Norman	S	R	170	48	3:1	1.033	0.50–0.30
BR-1 x Norman	S	R	49	25	3:1	3.044	0.10–0.05
Mahoba Local x Abyssinian	S	R	161	43	3:1	1.672	0.20–0.10
Mahoba Local x Clay	S	R	179	60	3:1	0.0013	0.95–0.90
Mahoba Local x Birio	S	R	153	54	3:1	0.129	0.80–0.70
Mahoba Local x Dakota	S	R	234	81	3:1	0.085	0.80–0.70
Mahoba Local x Polk	S	R	181	51	3:1	1.125	0.30–0.20
Mahoba Local x Min. R 3115	S	R	147	51	3:1	0.060	0.90–0.80
Neelum x EC 9830	S	R	120	26	3:1	3.709	0.10–0.50
Kangra Local x Min. R 3115	S	R	124	43	3:1	0.049	0.90–0.80
Kangra Local x Min. R 3083	S	R	142	37	3:1	1.789	0.20–0.10
Pooled over 15 crosses	—	—	2560	831	3:1	0.454	0.70–0.50

RESULTS AND DISCUSSION

All the F₂ plants were resistant, indicating that rust resistance is dominant over susceptibility in all the crosses.

The F₂ progenies of three crosses involving the resistant parent EC 41628 and susceptible cultures Afgan-6, Deta and EC 421 segregated in monohybrid ratios for rust resistance, indicating presence of one dominant gene for resistance in the genotype EC 41628. Similarly, F₂ plants of the cross between resistant parent Norman and three susceptible parent, BR-1, EC 544 (W) and NP (RR) 65, also segregated in the ratio of 3 resistant : 1 susceptible, confirming monogenic dominance of Norman reported earlier [9]. The cross Neelum x EC 9830 also gave 3 resistant : 1 susceptible, segregation in F₂ generation indicating presence of one gene in EC 9830. Similar monogenic ratios were recorded in the crosses of Mahoba Local with six resistant parents and Kangra Local with two resistant parents. Monogenic control of rust resistance was confirmed in all these crosses.

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