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INHERITANCE OF RESISTANCE TO RUST IN PEARL MILLET

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ABSTRACT

The inheritance of resistance to rust (*Puccinia penniseti* Zimm.) in pearl millet was studied in different generations of twenty crosses involving resistant and susceptible parents. Resistance was found to be a dominant trait with monogenic control.

Key words: *Puccinia penniseti*, monogenic, inheritance.

In pearl millet, rust is a major diseases limiting the exploitation of heterosis. Therefore, development of a variety/hybrid for rust resistance is of great importance to increase its production in India and many other countries.

MATERIALS AND METHODS

Five inbred varieties of pearl millet [*Pennisetum amaricanum* (L.) Leeke], viz. PT 732B, 81B, ICMPES11, ICMPES 15 and PT 3832 belonging to different ecogeographical locations were raised at the National Pulses Research Centre, Vamban. PT 3832 is highly resistant to rust [1]. The crosses were made between the parents in all possible combinations including reciprocals. The F_1 was advanced to F_2 generation and backcrosses were also made to have a complete set of F_1, F_2, BC_1, BC_2 and both parents involved in all crosses for the study in the same year. A mixture of seed of the most susceptible genotypes was used as infector rows after every four rows of the tester and around each plot. Rust infected leaves were collected, rinsed in distilled water, uredospore suspension prepared and sprayed uniformly in all the plants on 30th and 45th day of growth. Heavily infected plants were also spread between the rows to give high rust inoculum. The disease score was recorded 75 days after sowing using the modified Cobb scale [2]. The plants with disease score 1 were treated as resistant and those with score 2 and above were considered to be susceptible.

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RESULTS AND DISCUSSION

Eight out of the 20 hybrids were resistant. The results indicated that when the resistant parent is used as male or female, the hybrid is always resistant. This means that resistance is dominant over susceptibility. Dominance of resistance over susceptibility was also reported earlier [3]. Hanna et al. [4] observed that resistance was dominant over susceptibility in *Pennisetum americanum* (L.) Leek ssp. *monodil* (Maire) Brunken.

The distribution of resistant and susceptible plants in F_2 generation of the eight crosses presented in Table 1 showed that the crosses involving the resistant parent PT 3832 with all the eight susceptible parents gave a segregation of 3 resistant : 1 susceptible plants,

Table 1. Segregation for rust resistance in F_2 and BC_1 generation of pearl millet

Cross	Generation	No. of plants		χ^2	P value	Segregation
		resistant	susceptible			R : S
PT 3832 x ICMPES 11	F_2	335	100	0.938	0.50–0.25	3 : 1
	BC_1	98	90	1.42	0.25–0.10	1 : 1
PT 3832 x ICMPES 15	F_2	211	58	1.69	0.25–0.10	3 : 1
	BC_1	98	93	2.40	0.25–0.10	1 : 1
PT 3832 x 81B	F_2	133	31	3.25	0.10–0.05	3 : 1
	BC_1	98	80	1.82	0.25–0.10	1 : 1
PT 3832 x 732B	F_2	236	82	0.43	0.75–0.50	3 : 1
	BC_1	94	76	1.90	0.25–0.10	1 : 1
ICMPES 11 x PT 3832	F_1	292	108	0.85	0.50–0.25	3 : 1
	BC_1	149	142	0.16	0.75–0.50	1 : 1
81B x PT 3832	F_2	120	148	1.15	0.50–0.25	3 : 1
	BC_1	160	152	0.20	0.75–0.50	1 : 1
ICMPES 15 x PT 3832	F_2	315	117	1.00	0.50–0.25	3 : 1
	BC_1	91	73	1.98	0.25–0.10	1 : 1
732B x PT 3832	F_2	216	87	2.24	0.25–0.10	1 : 1
	BC_1	86	69	1.86	0.25–0.10	1 : 1

indicating thereby that rust resistance is monogenically dominant over susceptibility. The observations on BC_1 showed a segregation of 1 resistant : 1 susceptible plants, while all the BC_2 populations were resistant. These results confirm the single gene control of resistance in PT 3832. Andrews et al. [3] assigned gene symbol RPP_1 for the single dominant gene in the strain 2696.

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