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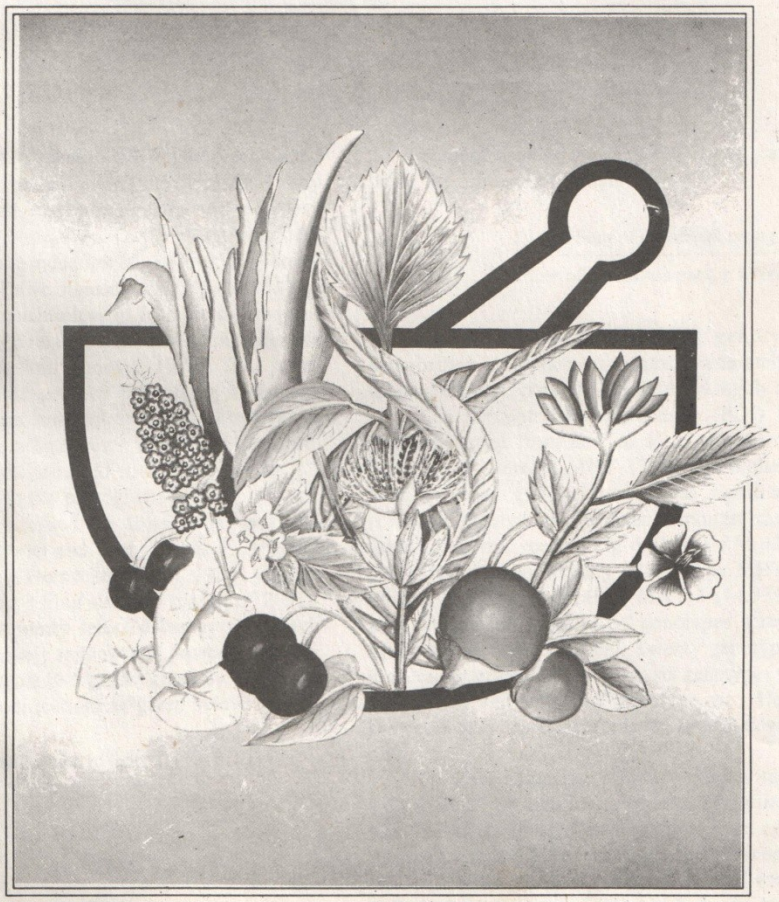

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Screening for Reaction to Downy Mildew and Powdery Mildew Diseases in Muskmelon

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The muskmelon *(Cucumis melo* L.) crop is affected by many diseases and pests. Among the diseases, downy mildew (*Pseudoperonospora cubensis*) and powdery mildew (*Erysiphe cichoracearum*) are most prominent and restrict successful production of muskmelon (Jhooty and Munshi, 1975). These diseases impair the quality of fruits in addition to causing loss in fruit yield. Frequent rains coupled with high relative humidity favours disease development (Bains and Jhooty, 1976). The non-availability of reliable sources possessing resistance against both the diseases hampers its successful cultivation as well as breeding programmes. Hence, the present investigation was undertaken to search out source for resistance against both the pathogens. Reaction to both the diseases were assessed on foliage of thirty-six germplasm (eight parents and twenty-eight F_1 hybrids) under field conditions at Horticulture Farm, S.K.N. College of Agriculture, Jobner during summer season of 2001.

Twenty-five randomly selected leaves from each line were rated for downy mildew and powdery mildew reaction following a scale (0-5 grade) given by Mckinney (1923) with some modifications as given below:

Grade	Leaf area affeeted (%)
0	0
1	1.1-10.0
2	10.1-25.0
3	25.1-40.0
4	40.1-50.0
5	>50.0

Percent disease intensity (PDI) was calculated by using the following formula:

$$\text{PDI (\%)} = \frac{\text{Sum of numerical rating x 100}}{\text{Number of leaves assessed x Maximum rating}}$$

Based on PDI values, the genotypes were categorized as immune, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible.

The percent disease intensity (PDI) for downy mildew ranged from 8.67 to 52.27 percent in parents, being the lowest in MHY-3 and the highest in Hara Madhu (Table 1). The former was significantly most resistant amongst the parents. Amongst the F_1's, the lowest PDI was recorded in the cross RM-43 x MHY-3 (12.73%) non-significantly followed by MHY-3 x Hara Madhu (14.20%) and MS_1 x MHY-3 (14.93%), Table 1 also revealed that out of 36 genotypes screened; only MHY-3 was found resistant. Twenty genotypes showed moderately susceptible whereas, six genotypes were found susceptible and only one genotype *viz.,* Hara Madhu showed highly susceptible reaction against downy mildew disease.

The PDI values for powdery mildew ranged from 8.53 to 56.80 percent in the parents, being the lowest in RM-43 and it had significantly higher level of resistance compared to all other parental lines except MHY-3 (9.87%). Amongst the F_1's the lowest PDI was recorded in RM-43 x MHY-3 (8.87%) which can be registered as significantly resistant over all other F_1's. Out of 36 genotypes screened for powdery mildew, 3 genotypes

TABLE 1

Reaction to muskmelon genotypes (parents and F_1's) to downy mildew and powdery mildew diseases under field conditions

Parents and F_1's	Downy mildew		Powdery mildew	
	PDI (**)	Disease reaction	PDI(**)	Disease reaction
MS_1	26.06 (19.33)	MR	28.54 (22.87)	MR
RM-43	24.64 (17.40)	MR	16.96 (8.53)	R
MHY-3	17.09 (8.67)	R	18.25 (9.87)	R
Punjab Sunehri	25.69 (18.80)	MR	22.99 (15.27)	MR
Jobner Local	35.37 (33.53)	MS	38.89 (39.60)	MS
Hara Madhu	46.30 (52.27)	HS	48.92 (56.80)	HS
Tonk Local	40.71 (42.60)	S	42.55 (45.73)	S
Durgapura Madhu	28.74 (23.13)	MR	28.36 (22.60)	MR
MS_1 x RM-43	25.13 (18.07)	MR	20.48 (12.27)	MR
MS_1 x MHY-3	22.72 (14.93)	MR	23.17 (15.53)	MR
MS_1 x Punjab Sunehri	25.30 (18.27)	MR	26.38 (19.80)	MR
MS_1 x Jobner Local	31.77 (27.73)	MS	32.04 (28.20)	MS
MS_1 x Hara Madhu	33.62 (30.67)	MS	36.54 (35.47)	MS
MS_1 x Tonk Local	37.42 (36.93)	MS	34.29 (30.13)	MS
MS_1 x Durgapura Madhu	24.79 (17.60)	MR	26.75 (20.27)	MR
RM-43 x MHY-3	20.88 (12.73)	MR	17.30 (8.87)	R
RM-43 x Punjab Sunehri	23.44 (15.87)	MR	20.07 (11.80)	MR
RM-43 x Jobner Local	30.91 (26.40)	MS	28.75 (23.13)	MR
RM-43 x Hara Madhu	39.95 (40.67)	S	43.59 (47.40)	S
RM-43 x Tonk Local	38.84 (39.33)	MS	33.37 (30.27)	MS
RM-43 x Durgapura Madhu	24.29 (16.93)	MR	24.93 (17.80)	MR
MHY-3 x Punjab Sunehri	23.15 (15.47)	MR	21.51 (13.47)	MR
MHY-3 x Jobner Local	27.87 (21.87)	MR	33.66 (30.73)	MS
MHY-3 x Hara Madhu	22.12 (14.20)	MR	41.51 (43.93)	S
MHY-3 x Tonk Local	24.54 (17.27)	MR	35.83 (34.27)	MS
MHY-3 x Durgapura Madhu	25.34 (18.33)	MR	23.86 (17.27)	MR
Punjab Sunehri x Jobner Local	29.72 (24.60)	MR	27.41 (21.20)	MR
Punjab Sunehri x Hara Madhu	33.99 (31.27)	MS	46.07 (51.87)	HS
Punjab Sunehri x Tonk Local	37.14 (36.47)	MS	40.28 (41.80)	S
Punjab Sunheri x Durgapura Madhu	26.08 (19.20)	MR	23.67 (16.13)	MR
Jobner Local x Hara Madhu	40.01 (41.33)	S	42.97(46.47)	S

Contd....

Parents and F_1's	Downy mildew		Powdery mildew	
	PDI (**)	Disease reaction	PDI(**)	Disease reaction
Jobner Local x Tonk Local	40.24 (41.73)	S	45.00 (50.00)	S
Jobner Local x Durgapura Madhu	30.79 (33.73)	S	32.49 (28.87)	MS
Hara Madhu x Tonk Local	47.57 (26.27)	MS	47.06 (53.60)	HS
Hara Madhu x Durgapura Madhu	40.30 (41.87)	S	35.90 (34.40)	MS
Tonk Local x Durgapura Madhu	37.26 (36.67)	MS	30.35 (25.53)	MS
Hybrid Abhijeet (Check)	34.20 (31.60)	MS	37.50 (37.07)	MS
SEd±	**1.089**	–	**1.181**	–
CD at 5%	**2.171**	–	**2.354**	–

*Significant at p = 0.05.
Figures in parentheses are orginal values (PDI).
R = Resistant, MR = Moderately resistant, MS = Moderately susceptible, S = Susceptible, HS = Highly susceptible.

TABLE 2
Mean performance of resistance muskmelon genotypes for different horticultural characters

Genotypes	Characters														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MHY-3	1.98	3.80	45.27	88.53	0.67	2.27	1.53	22.40	6.70	0.32	2.08	12.83	1.33	8.67	9.87
RM-43	1.79	3.47	40.47	82.40	0.58	2.13	1.24	23.73	6.36	0.53	2.24	12.51	2.33	17.40	8.53
RM-43 x MHY-3	2.08	4.00	40.53	79.33	0.72	2.40	1.74	25.60	5.83	0.54	2.38	12.51	2.44	12.73	8.87

1 = Vine length (m)
2 = Number of vine per plant
3 = Days taken to first female flower
4 = Days taken to first fruit harvest
5 = Average weight of first three harvested fruits (kg)
6 = Number of marketable fruit per plant
7 = Fruit yield per plant (kg)
8 = Harvest duration (days)
9 = Size of seed cavity (cm)
10 = Rind thickness (cm)
11 = Flesh thickness (cm)
12 = Total soluble solids (%)
13 = Shelf-life (days)
14 = Severity of downy mildew (%)
15 = Severity or powdery mildew (%)

viz., RM-43, MHY-3 and RM-43 x MHY-3 were found to be resistant. Fourteen genotypes were found to be moderately resistant, ten moderately susceptible and rest nine genotypes exhibited susceptible reaction to the disease (Table 1). However, some earlier work had reported a resistance in Durgapura Madhu (Chauhan, 1984). This difference in results might be due to prevalence of new pathotype under Jobner conditions which have made the resistant genotypes to behave as susceptible.

A critical perusal of the data (Table 2) on the mean performance of parents and F_1's for various horticultural traits showed that the cross RM-43 x MHY-3 performed best for the maximum number of characters. Genotype MHY-3 exhibited higher degree of resistance against both the diseases but has poor shelf-life and took more number of days for first fruit harvest.

The results of the present study, therefore, would be of greater help in strengthening the breeding programme to develop the resistance against both the mildews and stabilizing production and quality of muskmelon.

REFERENCES

1. Bains, S.S. and Jhooty, J.S., (1976). Overwintering of *Pseudoperonospora cubensis* causing downy mildew of muskmelon, *Indian Phytopath., 29,* pp. 213-214.
2. Chauhan, M.S., (1984). Reaction to genetic stock of squash and muskmelon against diseases, *HAU J. Res.,* pp. 545-547.
3. Jhooty, J.S. and Munshi, G.D., (1975). Control of downy mildew of muskmelon with fungicides, *Indian J. Mycol. Pl. Path., 5,* pp. 105-106.
4. Mckinney, H.H., (1923). Influence of soil, temperature and moisture on infection of wheat seedlings by *Helminthosporium sativum, J. Agric. Res., 26,* pp. 195-217.