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Research Article

SCREENING OF *FOENICULUM VULGARE* (FENNEL) VARIETIES AGAINST POWDERY MILDEW AND *RAMULARIA* BLIGHT AND EFFECT OF DATE OF SOWING ON DISEASE INCIDENCE

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ABSRACT
95 to 105 days old plants of fennel (*Foeniculum vulgare)* indicated that period of 14 weeks from sowing was favourable for initiation and further spread of blight disease. The mildew disease symptoms appeared when crop was 12 weeks old from the date of sowing. The lowest blight and mildew disease incidence was observed in October sown crops with (65-70%) Relative humidity. The highest disease incidence was observed in late sown crops (around 15 Dec.) with R.H. (75-80%) and Temp. 20±2◦C.

Key Words*: Foeniculum Vulgare, Disease Incidence, Powdery Mildew, Oidium Sp.*

INTRODUCTION

Fennel (*Foeniculum vulgare)* belongs to family Umbelliferea (Apiaceae) and is believed to be native of the Mediterranean and near Eastern regions. Rajasthan contribute to a large fennel growing as well as production areas. The seeds of fennel are used as a condiment or spice in curries, pickles and in cooking. Fennel seeds have many medicinal properties also. Powdery mildew and *Ramularia* blight diseases are major problem of fennel cultivation in our country. The most commonly known and the most effective means of controlling plant diseases is the use of resistant source in plant breeding programme. In present investigation, the fennel seeds were screened for their resistance against powdery mildew and *Ramularia* blight pathogens *in vivo*.

MATERIALS AND METHODS

The trial was conducted during the years 2010-2011 and 2011-2012 at Department of Botany, University of Rajasthan and also in fields of Khatipura of Jaipur division. Seeds of 17 available fennel varieties procured from Department of Plant Breeding and Genetics, S.K.N. college of Agriculture, Jobner, Jaipur. Were screened for varying degree of resistance against powdery mildew and *Ramularia* blight pathogens. The study was laid out in CRD with three replicates of ten seeds each sown in pots. These plants were sown in natural condition and were regularly observed for the development of the disease till harvest, without adding any inoculum. These varieties were viz. UF-205, UF-206, UF-207, RF-101, RF-125, RF-178, GF-2, FNL-25, FNL-26, FNL-27, FNL-28, FNL-29, FNL-30, FNL-31,FNL-32, FNL-35 and local.

RESULTS AND DICUSSION

Out of seventeen varieties screened none was found totally resistant to powdery mildew in which local cultivar was used as control (Table- 1&2). The plants of variety UF-205 and GF-2 were moderately susceptible to powdery mildew and *Ramularia* blight respectively while variety Uf-207, RF-101 and RF-125 were fairly resistant to powdery mildew. Variety RF-125, UF-205 and RF-178 were fairly resistant to *Ramularia* blight. The variety UF-206 and RF-101 were highly resistant to powdery mildew and *Ramularia* blight respectively. Varieties RF-178, FNL-25, FNL-26, FNL-27, FNL-28, FNL-29 wera found fairly susceptible to *Ramularia* blight. UF-207, FNL-25, FNL-26, FNL-27, FNL-28 and FNL-29 were found fairly susceptible to powdery mildew. Rest of varieties was found susceptible to *Ramularia*

Table 1: Screening of different varieties of fennel for powdery mildew resistance.

S. No.	Fennel varieties	Symptoms appearance of powdery mildew						Disease intensity of fruiting stage
		Leaf		Stem		Fruit		
		2010	2011	2010	2011	2010	2011	2010-11
1.	UF-205	99	98	105	105	134	132	MS
2.	UF-206	95	90	100	97	125	126	HR
3.	UF-207	98	94	102	103	130	129	FR
4.	RF-101	98	95	102	103	128	130	FR
5.	RF-125	98	95	104	103	128	130	FR
6.	RF-178	105	100	111	109	140	136	FS
7.	FNL-25	106	100	112	108	140	134	FS
8.	FNL-26	107	101	112	108	138	136	FS
9.	FNL-27	107	102	113	107	136	138	FS
10.	FNL-28	108	101	114	108	136	138	FS
11.	FNL-29	109	102	114	109	138	136	FS
12.	FNL-30	109	104	116	111	144	144	S
13.	FNL-31	110	102	115	112	141	143	S
14.	FNL-32	109	102	116	113	142	141	S
15.	FNL-35	109	104	117	114	142	142	S
16.	GF-2	100	99	105	106	135	132	MS
17.	Local	111	105	118	117	146	146	HS

HR = Highly resistant; MR = Moderately resistant; HS = Highly susceptible; FS = Fairly susceptible S = Susceptible

Table 2: Screening of different varieties of fennel for *Ramularia* blight resistance.

S. No.	Fennel varieties	Symptoms appearance of *Ramularia* blight						Disease intensity of fruiting stage
		Leaf		Stem		Fruit		
		2010	2011	2010	2011	2010	2011	2010-11
1.	UF-205	96	92	99	101	132	128	FR
2.	UF-206	97	95	105	103	133	136	MS
3.	UF-207	97	97	107	104	138	139	FS
4.	RF-101	92	98	98	95	128	126	HR
5.	RF-125	96	93	101	101	132	128	FR
6.	RF-178	96	93	103	101	132	128	FR
7.	GF-2	97	95	105	102	136	136	MS
8.	FNL-25	98	97	110	104	138	138	FS
9.	FNL-26	98	97	111	105	138	138	FS
10.	FNL-27	98	99	111	106	139	139	FS
11.	FNL-28	102	100	112	104	139	139	FS
12.	FNL-29	103	100	112	109	140	140	S
13.	FNL-30	104	100	114	110	140	140	S
14.	FNL-31	105	102	114	111	140	141	S
15.	FNL-32	106	102	114	112	141	142	S
16.	FNL-35	107	102	115	112	142	141	S
17.	Local	108	103	116	114	144	144	HS

HR = Highly resistant; MS = Moderately susceptible; HS = Highly susceptible; FR = Fairly resistant; S = Susceptible

Table 3: Effect of sowing date on the incidence of powdery mildew and *Ramularia* blight of fennel

S. No.	Date of sowing	Days after sowing when disease appear		Crop state	Nature of disease	% disease index		Meteorological parameters			
		2010-11	2011-12			2010-11	2011-12	Mean temp.		Mean humidity	
1.	15 Oct.	105	102	Seed setting	Restricted to leaves, fruit escape damage	27	22	26°C	23.5	65	70
2.	30 Oct.	100	95	Seed setting	Restricted to leaf and stem, fruit escape damage	28	25	24.5°C	22.1	68	75
3.	15 Nov.	92	94	Fruit formation stage	Infection was higher on leaves and stem, less on fruits	35	30	21.0	21.6	70	67
4.	30 Nov.	83	80	Flowering, stage/Fruit formation stage	Leaves, stem and fruits were affected	30	30	20.0	21.1	72	71
5.	15 Dec.	75	71	Flowering stage	Leaf, stem and fruits were heavily infected	36	37	16.0	19.0	80	74

blight and powdery mildew. But the local cultivar was found highly susceptible to both *Ramularia* blight and powdery mildew disease.

Screening of different varieties against powdery mildew has been reviewed in different plant by several workers (Somprakash *et al.,*1999 ; Sharma and Chauhan, 2000 ; Raje-RS *et al*., 2002 ; Avtar and Rathi, 2003 ; Bansal, 2006 and Deepak, 2007). 95-105 days old plants of fennel indicated that in early sowing (15^{th} Oct. to 30^{th} Oct.), the disease symptoms appeared on the leaves in the second and third week of January (95-105 days after sowing), while in the crop sown from 15^{th} to 30^{th} Nov., *Ramularia* blight and powdery mildew appeared when the crop was still at flowering or fruit formation stage and the environmental conditions were more favourable for disease development. In late sown crops (15 Dec.) very severe infection in which all plant parts, leaf, stem and fruits were heavily infected. It was found that disease intensity with two early sown dates was comparatively less than at the later sowing dates. It was also observed that high relative humidity of 70-80% and optimum temperature (20±2◦C) during the growth of crop from 15 Nov. to 15 Dec., 2007-08 and 2008-09 were favourable for disease development (Table-3). Similar work has also been reported for powdery mildew incidence by Sharma (1998); Mathur *et al* (1972); Dhruj et al (1996). Similar work has also been reported on powdery mildew by Kumari and Prasad (1998) in pea infected by powdery mildew. Xu *et al.* (2002) in *Clematis* infected by powdery mildew and Singh et al. (2004) in black gram infected with powdery mildew caused by *Erysiphe polygoni* DC. Bansal (2006) reported effect of some weather parameters on the development of powdery mildew in fenugreek infected with *Erysiphe polygoni* DC. Similar work has also been reported by Deepak (2007) in *Cumin* infected with bligh

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