

Effect of date of sowing on *Ramularia* blight of fennel and its correlation with weather parameters

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Abstract

Ramularia blight of fennel appears during the month of January and March when the crop attains an age of 2 to 3 months. Among different dates of sowing, the early sown crop (21st October) proved to be the most effective in reducing the disease (28.17 %) and increasing the seed yield of fennel (1717 kg ha⁻¹). The highest volatile oil per cent (2.40) and 1000-seed weight (6.55 g) also recorded in case of early sown crop *i.e.*, 21st October (D₁), and lowest in late sown crop of 1st December (D₅). The correlation between *Ramularia* blight PDI and weather parameters was non-significant in case of early sown crop of 21st Oct. In sowing of 11th Nov. maximum and minimum temperature showed positive and significant correlation with disease intensity. In late sowing of 1st Dec., the maximum and minimum temperature showed negative and significant correlation whereas, wind speed recorded positive and significant correlation with per cent disease intensity of *Ramularia* blight in fennel.

Key words : *Foeniculum vulgare*, disease incidence, *Ramularia* blight, weather parameters.

Introduction

Fennel (*Foeniculum vulgare*) belongs to family Umbelliferae and is believed to be native of the Mediterranean and near Eastern regions. Gujarat and 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. Fennel is a cold weather crop and comes up well under dry and cold climate. It is cultivated mainly as transplanted crop in India. However, during recent past, experimental evidences have proved good scope of *rabi* drilled fennel in Gujarat (Mehta *et al.*, 1990). Area under *rabi* drilled fennel is increasing due to reduction in growing period as compared to transplanted crop, an ever increasing demand for fennel seeds and being a more profitable crop as compared to other *rabi* crops like cumin, mustard, wheat and gram. Fennel seeds are pale yellow in colour which contains 1.4 to 3.0 per cent essential volatile oil. *Ramularia* blight disease is a 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. However, change in sowing time lead to significant change in weather parameter and consequently the performance of the crop. In addition to crop management, the physical environment has profound influence on growth, biomass production and oil accumulation. Temperature, sunlight and other

meteorological factors may individually or collectively limit the plant growth and production. Date of sowing has an important role in deciding growth and production. Adjustment in sowing time creates favourable environmental conditions for better performance of all physiological processes in plant and for escaping from pest and diseases which provides great opportunity to maximize the production. Keeping in view experiment was conducted to see the effect of date of sowing on *Ramularia* blight of fennel and its correlation with weather factors.

An experiment was conducted during the year 2015-16 at Seed Spices Research Station, Jagudan, S. D. Agricultural University, Sardarkrushinagar. Fennel variety Gujarat Fennel-12 (GF-12) was sown in the month of october to December in five date of sowing at a distance of 45 cm in a plot size 4.0 × 3.6 sqm. The study was laid out in RBD with four replicates. The plants were regularly observed for the development of the disease till harvest, under natural conditions without adding any inoculum. Observations for *Ramularia* blight was recorded from 20 tagged plants of a plot in different sowing dates at 10 days interval and disease PDI was worked out by following formula (Datar and Mayee, 1981).

Percent Disease Intensity (PDI) =

$$= \frac{\text{Sum of all numerical ratings}}{\text{Total plants examined} \times \text{Maximum ratings}} \times 100$$

The crop was harvested after 160 to 170 days when the seeds were matured and dried enough to be separated by

threshing. The seeds were cleaned and plot wise yield was recorded. Yield per hectare was calculated and subjected to statistical analysis. The analysis of volatile oil content from fennel seeds was carried out using steam distillation method (AOAC, 2000) from 25 g sample collected from plot wise harvested seeds. The 1000-seeds of fennel were manually calculated from the yield lot of each plot and weighed on digital analytical balance of 10 g capacity. The data were recorded for each sample and subjected to statistical analysis. During the period of investigation, the standard week wise weather parameters viz., maximum temperature, minimum temperature, mean temperature, relative humidity, bright sunshine hours and wind speed were recorded from meteorological observatory, Seed Spices Research Station, S. D. Agricultural University, Jagudan and correlation coefficient was calculated with *Ramularia* blight PDI.

During the experimentation year 2015-16, the per cent disease intensity (PDI) of *Ramularia* blight was minimum (28.17 %) with seed yield of 1717 kg ha⁻¹ in case of early sown crop of 21st October (D₁). Whereas, seed yield (937 kg ha⁻¹) was lowest and PDI (64.33 %) was maximum in late sown crop of 1st December (D₅) (table 1). The highest volatile oil per cent (2.40) and 1000-seed weight (6.55 g) was also recorded in case of early sown crop i.e., 21st October (D₁), whereas, it was lowest in late sown crop of

1st December (D₅). The correlation between disease intensity and weather parameter was non-significant in case of early sown crop of 21st Oct. In sowing of 11th Nov. maximum and minimum temperature showed positive and significant correlation with disease intensity. In late sowing of 1st Dec., the maximum and minimum temperature showed negative correlation whereas, wind speed recorded positive and significant correlation with per cent disease intensity of *Ramularia* blight in fennel (table 2). Parashar and Lodha (2012) reported that in early sowings (15th October to 30th October), the disease symptoms appeared on the leaves of 95 to 105 days old plants of fennel in second and third week of January, while in the crop sown from 15th to 30th November, *Ramularia* blight appeared when the crop was still at flowering or fruit formation stage and the environmental conditions were more favourable for disease development. Very severe infection in late sown crops (15th December) in which all plant parts like leaf, stem and fruits were heavily infected. It was found that disease intensity with two early sown dates was comparatively lesser than later sowing dates. It was also observed that high relative humidity of 70 to 80 per cent and optimum temperature (20 ± 2 °C) during the crop growth from 15th November to 15th December were favourable for disease development. Our results are in accordance with the findings of Parashar and Lodha, 2012.

Table 1. Effect of different dates of sowing on *Ramularia* blight PDI, seed yield and volatile oil content of fennel

Treatments	Disease intensity (%)	Seed yield (kg ha ⁻¹)	1000-seed weight (g)	Volatile oil (%)
D ₁ : 21 st October	32.22 (28.17)*	1717	6.55	2.40
D ₂ : 1 st November	36.42 (34.92)	1513	6.45	2.30
D ₃ : 11 th November	48.08 (54.87)	1093	6.12	2.00
D ₄ : 21 st November	44.55 (48.75)	1172	6.25	2.10
D ₅ : 1 st December	53.65 (64.33)	937	6.00	1.80
S.Em. ±	1.45	72.97	0.09	0.06
C.D. at 5 %	4.48	194.73	0.27	0.18

* Figures in parentheses retransformed values

Table 2: Correlation coefficient of meteorological variables with *Ramularia* blight PDI in different dates of sowing

Variables	Correlation co-efficient "r"				
	21 st	1 st	11 th	21 st	1 st
	October (D ₁)	November (D ₂)	November (D ₃)	November (D ₄)	December (D ₅)
Minimum temperature (°C)	NS	1.00	0.95	NS	-0.79
Maximum temperature (°C)	NS	NS	1.00	-0.90	-0.89
Mean temperature	NS	NS	NS	NS	NS
Relative humidity (%)	NS	NS	NS	1.00	NS
Wind speed (km/hr)	NS	NS	NS	NS	1.00
Critical value (0.05) ±	0.82	0.82	0.82	0.82	0.82

References

- A.O.A.C. 2000. Official method of analysis, Association of Official Agricultural Chemist, 11th Edn., Washington, D.C.
- Datar, V.V. and Mayee, CD. 1981. Assessment of loss in tomato yield due to early blight. *Indian Phytopathology*. 34 (2): 191-195.
- Mehta, K.G.; Patel, P.G. and Patel, I.D. 1990. A new avenue of fennel cultivation in Gujarat. *Indian cocoa, Arecanut and Spices Journal*. 13 (4): 139-141.
- Parashar, A. and Lodha, P. 2012. Screening of *Foeniculum vulgare* (fennel) varieties against powdery mildew and *Ramularia* blight and effect of date of sowing on disease incidence. *International Journal of Food, Agriculture and Veterinary Sciences*. 2: 142-146.

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