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EFFECT OF SOWING DATES AND WEATHER PARAMETERS ON STEM GALL DISEASES OF CORIANDER IN THE HADOTI REGION OF RAJASTHAN INDIA

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ABSTRACT

Coriander (*Coriadrum sativum* L.) belongs to the family Apiaceae is a spice crop cultivated during winter season in India. This experiment was conducted at Agricultural Research Station, Kota and in this experiment three date of sowing (30th October, 15th November and 30th November) of coriander was done in pot conditions. Stem gall disease intensity and AUDPC were observed minimum in 3rd date of sowing *i.e.*, 30th November. The stem gall disease of coriander and weather conditions showed significant positive correlation.

***Key words*:** Coriander, Date of sowing, Weather parameters

Introduction

Spices play an important role not only as condiments but in the Indian agricultural economy owing to medicinal, industrial and processing points of view. India is considered as "home of spices" because of their highest quality in the world. Coriander (*Coriandrum sativum* L.) is an annual herbaceous plant (2n = 22) in the family Apiaceae. It is grown as the principal crop of India during the winter months (Singh and Verma, 2015).

In India coriander is mainly grown as *Rabi* season crop. The total area and production under coriander crop in India is 583 thousand ha. and 791 thousand mt respectively in 2023-24 (Source- Spices Board, India & Ministry of Agriculture and Farmers Welfare, Govt. of India). The state like Madhya Pradesh, Rajasthan, Gujarat, Assam are chief production of coriander. The Area, Production of coriander in Rajasthan (2022-23) is 75916 ha, 107237 tonnes respectively. Major growing districts in Rajasthan are Jhalawar (Area-54230 ha, production-66234 tonnes), Kota (Area-20902 ha, production-34689 tonnes), Baran (Area-11487 ha, Production-18033 tonnes), Bundi (Area-917 ha, production- 1311 tonnes) (Rajasthan Agricultural Statistics at a glance 2022-23).

The disease appears continuously every year in field of coriander grown on high soil pH, moisture, and adverse ecological and edaphic factors (Saxena *et al.*, 2002). It is the most common, widespread, and damaging disease affecting almost every cultivar irrespective of geographical and ecological differences (Khare *et al.*, 2017). The stem gall of coriander appears continuously every year in *Hadoti* when grown in a field having high soil pH and congenial or favourable environmental conditions (Verma *et al.*, 2017).

Materials and Methods

The experiment was laid out in cage house of Agricultural Research Station, Ummedganj, Kota. The pot was filled with sick soil and healthy soil. Coriander genotype (JCr 13-7) surface sterilized ten seeds were sown in pot 12-inch diameter under natural conditions using complete randomized design with three replications on three dates of sowing *viz;* 30th October, 15th November and 30th November during Rabi 2021-22. Other recommended cultural practices were adopted for optimum crop growth and observation of disease intensity

Table 1: Meteorological data on weather parameters (weekly) during the period of coriander crop in *Rabi* 2021-22.

SMW	Weather Parameters					
	Temp. (°C)		RH (%)		Rainfall (mm.)	Rainy Days
	Max.	Min.	Mor.	Eve.		
43	31.7	20.7	51.8	34.0	0	0
44	30.7	19.5	48.0	36.5	0	0
45	29.7	18.4	51.7	33.5	0	0
46	27.9	17.5	60.8	34.8	0	0
47	25.8	15.2	87.8	57.5	53.0	0
48	24.2	13.5	91.1	75.2	1.0	0
49	23.1	12.5	86.2	74.4	2.0	0
50	22.7	10.7	75.1	66.1	0	0
51	22.5	10.5	72.7	63.4	0	0
52	20.8	9.1	73.7	59.0	30.0	01
1	19.7	8.8	77.0	62.9	13.0	02
2	19.4	8.6	82.3	63.9	0	0
3	20.5	9.1	81.3	60.0	0	0
4	20.4	9.8	85.9	53.4	0	0
5	21.1	10.1	85.7	53.4	0	0
6	23.9	10.6	81.1	44.4	0	0
7	26.5	12.1	73.7	46.9	0	0
8	27.9	13.0	71.4	46.6	0	0
9	29.2	13.9	70.0	46.4	0	0
10	33.5	16.8	65.2	40.5	0	0.0

SMW: Standard Metrological Weeks; **RH:** Relative Humidity (%)

was recorded at weekly intervals using 0-4 scale. The data of weather on temperature, relative humidity and rainfall, for this experiment was collected from the Meteorology Laboratory at Agricultural Research Station, Ummedganj-Kota.

The score of each unit depends on the amount of the disease (on the length of stems and pedicle, an area covered for leaves and for seeds number of infected seeds). The disease relative scale used as per AICRP on Spices.

Calculation of Area Under Disease Progress Curve (AUDPC)

The area under disease progress curve was calculated by using the formula given by Vander plank (1963).

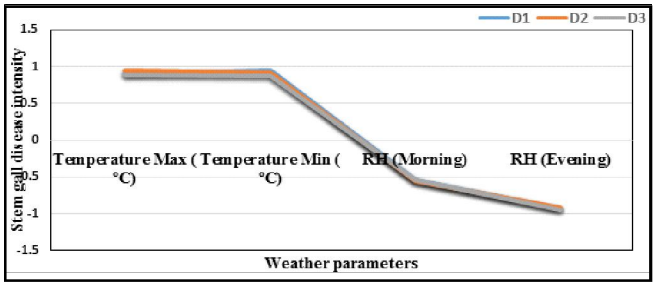

Fig. 1: Correlation between stem gall disease intensity and weather parameters.

Table 2: Disease rating scale for scoring stem gall disease of coriander.

Grade (Rating)	Disease Reaction	Symptoms	Description (%)
0	Highly resistance	No disease	0
1	Resistance	Galls on stem	1.1-5
2	Moderately resistance	Galls on stem & leaf	5.1-20
3	Susceptible	Galls on inflorescence	20.1-50
4	Highly susceptible	Galls on stem, leaf & inflorescence	>50

$$\text{AUDPC} = \sum_{i=1}^{n-1} [\left(.\frac{X_i + 1 + X_i}{2}\right) X\ (t_{i+1} - t_i\Big)]$$

Where

n-1 = Number of successive evaluations

Xi = Disease severity at time ti

Xi+1 = Disease severity at time ti+1

ti = Time when disease severity was Xi

ti+1 = Time when disease severity was Xi+1

Accordingly, the data related to the above parameters were recorded to calculate AUDPC.

Results

A pot experiment using sick soil was conducted in the net house of Agricultural Research Station, Ummedganj-Kota. The data in Table 3 and plate 1 showed that the disease appeared in January and reached its maximum in February. Among the date of sowing the minimum SGDI (7.81%) was observed in 30th November while, maximum SGDI (13.63%) in 30th October sowing.

Plate 1: Effect of date of sowing and weather parameter on stem gall disease of coriander.

Table 3: Effect of date of sowing and weather parameters on stem gall disease of coriander in pot experiment.

Date of Observations	Weather parameters				Stem gall disease intensity (%) and AUDPC					
	Temp. (°C)		RH		D_1 (30th Oct.)	AUDPC	D_2 (15th Nov.)	AUDPC	D_3 (30th Nov.)	AUDPC
	Max.	Min.	Morn.	Even.						
15th January	20.5	9.1	81.30	60.00	6.67	52.50	5.00	46.65	3.33	25.65
22nd January	20.4	9.8	85.90	53.40	8.33	64.15	8.33	61.25	4.00	32.65
29th January	21.1	10.1	85.70	53.40	10.00	75.84	9.17	67.09	5.33	47.81
05th February	23.9	10.6	81.10	44.40	11.67	93.34	10.00	81.65	8.33	63.00
12th February	26.5	12.1	73.70	46.90	15.00	114.34	13.33	105.00	9.67	68.84
19th February	27.9	13.0	71.40	46.60	17.67	130.69	16.67	123.69	10.0	72.90
26th February	29.2	13.9	70.00	46.40	19.67	138.84	18.67	131.84	10.83	76.40
05th March	33.5	16.8	65.20	40.50	20.00	-	19.00	-	11.00	-
Mean	25.3	11.92	76.78	48.95	13.63	-	12.43	-	7.81	-
SD	-	-	-	-	5.19	-	5.12	-	3.12	-
AUDPC	-	-	-	-	-	669.72	-	617.19	-	387.27

Initial disease symptoms were appeared in the second week of January on genotype JCr 13-7 sown on different dates *viz;* 30th October, 15th November, and 30th November and the progress of SGDI was observed in weekly intervals from 22nd January 2022 up to 05th March 2022, during that period the temperature ranged between 20.5-33.5°C (maximum) and 9.1-16.8°C (minimum), while RH ranged between 65.20-81.30% (morning) and 40.50-60.00% (evening) and sunshine hours range, wind speed and rainfall were 6.5-9.7 h, 0.1-0.2 and 0.0-0.0 mm respectively. (Table 3)

The results of stem gall disease intensity in coriander showed variation among different dates of sowing. Out of three sowing dates, minimum disease intensity was recorded with 3rd date of sowing *i.e.*, 30th November 2021 in JCr 13-7 as compared to 1st and 2nd date of sowing *i.e.*, 30th October and 15th November 2021 respectively.

The relationship between PDI and weather parameters during *Rabi* 2021-2022 were studied and revealed that temperature (maximum & minimum) and relative humidity (evening) were highly significant within three dates of sowing. The present study pointed out that the meteorological parameters reported in these studies doesn't reflect the microclimatic conditions existing in a coriander field. (Table 4).

Area Under Disease Progress Curve (AUDPC)

The Area Under Disease Progress Curve over a period was also computed as exhibited in Table 2. Based on the disease progression at different intervals, AUDPC was statistically analysed and it was found that the value of AUDPC was lowest (387.27) in 3rd date of sowing of crop at 30th November 2021 while it was maximum (669.72) where a crop was sown during 1st date of sowing at 30th October 2021. It was observed that, the AUDPC increased in JCr 13-7 when early sown of crop compared to late sowing crop. In the first date of sowing (30th October) the AUDPC increases continuously and the maximum increases to 138.84, along with this, in the second date of sowing (15th November) also the AUDPC was 131.84 and the lowest AUDPC remains 76.40 in the last sowing (30th November) and it is in the middle from 26th February to 5th March 2022 (Table 3).

Table 4: Correlation between stem gall disease intensity and weather parameters.

Date of Sowing	Temp (°C)		Relative Humidity	
	Maximum	Minimum	Morning	Evening
$D_1$30-10-21	0.8939**	0.8955**	-0.5422	-0.9253**
$D_2$15-11-21	0.9451**	0.9153**	-0.5635	-0.9208**
$D_3$30-11-21	0.8876**	0.8702**	-0.5412	-0.9512**
**Highly significant				

References

Anonymous (2022-23). Rajasthan Agricultural Statistics at a glance 2022-23. agriculture.rajasthan.gov.in/content/agriculture/en/ Agriculture-Department-dep/agriculture-statistics/area-production-and-yield.html

Anonymous (2023-24). Spices Board India. (adv.est) Statistics http// www.indianspices.com

Khare, M.N., Tiwari S.P. and Sharma Y.K. (2017). Disease problems in the cultivation of coriander (*Coriandrum sativum* L.) and their management leading to production of high-quality pathogen free seed. *International Journal of Seed Spices*, **7(1)**, 1-7.

Saxena, R.P., Dixit S., Pandey V.P. and Singh V.K. (2002). Germplasm screening for stem gall disease in coriander. *In: National Symposium on Integrated Management of Plant Disease of mid-Eastern India with a Cropping System Perspective*, held at NDUAT, Faizabad during 5-7 December.

Singh, R.K. and Verma S.S. (2015). Characterization of coriander (*Coriandrum sativum*) based on the morphological traits. *Journal of Agricultural Research*, **2**, 221-224.

Vanderplank, J.E. (1963) Plant Disease: Epidemics and Control. Academic Press, New York, 349.

Verma, P., Meena D.S., Jadon C. and Singh D.K. (2017). Effect sowing time and management practices on incidence of stem gall and seed yield of coriander (*Coriandrum sativum* L.). *International Journal of Seed Spices*, **7**, 79-81.