The Pharma Innovation Journal 2022; 11(12): 5525-5528

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 5525-5528

www.thepharmajournal.com
Received: 01-11-2022
Accepted: 15-11-2022

Khadatare RM
Assistant Professor, Department of Plant Pathology, College of Agriculture, MPKV, Rahuri, Ahmednagar, Maharashtra, India

Suryawanshi AP
Ex. Professor, Department of Plant Pathology, College of Agriculture, VNMKV, Parbhani Maharashtra, India

Giri VV
Department of Plant Pathology, Dr. BSKKV, Dapoli, Ratnagiri, Maharashtra, India

Joshi MS
Professor, Department of Plant Pathology, Dr. BSKKV, Dapoli, Ratnagiri, Maharashtra, India

Corresponding Author:
Khadatare RM
Assistant Professor, Department of Plant Pathology, College of Agriculture, MPKV, Rahuri, Ahmednagar, Maharashtra, India

Epidemiological studies of powdery mildew of okra

Khadatare RM, Suryawanshi AP, Giri VV and Joshi MS

Abstract
Powdery mildew disease (*Erysiphe cichoracearum* DC) is one of the most widely spread and destructive disease of okra (*Abelmschus esculentus* (L). Moench.), causing accountable quantitative as well as qualitative losses. The present studies on influence of weather parameters on powdery mildew during *Kharif*, 2018, the correlation-coefficient between weather parameters and powdery mildew disease severity on two okra cultivars revealed that maximum and minimum temperature, RH-I and II, wind velocity and rainfall were negatively correlated with the disease severity in both okra cultivars. Whereas, during *Rabi*, 2019, the correlation-coefficient between weather parameters and powdery mildew disease severity on two okra cultivars revealed that maximum and minimum temperature and wind velocity and rainfall were positively correlated with the disease severity in both okra cultivars.

Keywords: *Abelmschus esculentus*, *Erysiphe cichoracearum*

Introduction
Okra (*Abelmoschus esculentus* (L.) Moench) is an economically important fruit vegetable crop grown from seed in tropical and subtropical and warm temperature regions especially in U.S.A., Africa, Asia, Nigeria, Sudan, Turkey, Australia, U.K. and other neighboring countries of the world. In India, okra popularly grown round the year and major states growing okra are Andhra Pradesh (20%), West Bengal (15%), Bihar (14%), Orissa (11%) and Maharashtra shared only 4 per cent.

It's the most popular fruit vegetable crop grown in India, but it's production and productivity on farmers field has been hindered by various biotic and abiotic stresses. Among various factors responsible for low productivity of okra, diseases caused by biotic agents are the major one. The major diseases affecting okra crop are fungal *viz*., damping off (*Pythium debaryanum*), wilt (*Fusarium oxysporum* f.sp. *vasinfectum*), powdery mildew (*Erysiphe cichoracearum*), Cercospora leaf spot (*Cercospora abelmoschi* and *C. malayensis*) and viral disease yellow vein mosaic. Among these diseases, powdery mildew (*E. cichoracearum*) is one of threats in profitable cultivation of okra crop.

Material and Methods
Present investigations were carried out in the Department of Plant Pathology, College of Agriculture, Dapoli and Central Experiment Station, Wakawali. For the purpose, standard meteorological week-wise data recorded on powdery mildew intensity/severity, in the field experiments during (2018-19 and 2019-20) recorded were correlated with corresponding weekly weather parameters, computed the correlation coefficient and assessed their effects on okra powdery mildew severity.

Results and Discussion
Effect of weather parameters on okra powdery mildew severity during *Kharif*, 2018
Results (Table.1 and 2) revealed that the weather parameters *viz*., temperature (maximum and minimum), relative humidity (morning and evening), rainfall, rainy days and wind velocity etc. significantly influenced the powdery mildew disease severity in all two okra cultivars sown on 7th July during *Kharif*, 2018. From first appearance of the disease, its severity was found to be increased steadily in all two cultivars upto 90 DAS. For the purpose, observations on powdery mildew severity were recorded at weekly interval on two okra cultivars *viz*., Varsha uphar and Parbhani Kranti 7th July *Kharif*, 2018 and correlated with corresponding weekly weather parameters.

Table 1: Effect of weather parameters on powdery mildew disease severity in okra cultivars during *Kharif*, 2018

MW	Av. PDS		Temperature °C		Relative Humidity Morn.	Relative Humidity Eve.	Wind Velocity (Km/hr.)	Rainfall (mm)
	Varsha Uphar	Parbhani Kranti	Max	Min.				
36	2.03	4.04	33.91	22.61	92.6	81.48	1.42	68.40
37	3.25	6.41	34.07	22.72	90.64	71.18	1.22	0.00
38	6.88	7.84	34.34	22.89	92.29	79.57	1.22	80.40
39	7.34	8.66	35.04	23.36	93.58	71.3	0.9	61.50
40	8.05	9.25	34.13	22.75	92.38	62.14	0.9	31.00
41	12.19	13.45	35.2	23.47	92.38	62.14	0.9	31.00
42	13.09	14.38	33.91	22.61	93.51	64.49	0.52	11.30
43	13.69	14.89	32.36	21.57	93.87	64.6	0.76	34.30
44	16.14	18.23	30.24	20.16	84.26	46.57	0.63	0.00
45	17.78	18.98	32.68	21.79	85.1	44.57	0.87	0.00
46	18.97	20.45	27.82	18.55	86.04	60.84	0.8	0.00
47	21.34	22.98	31.28	20.85	85.53	33.03	0.7	0.00
48	29.52	33.86	24.38	16.25	83.5	45.82	0.9	0.00

MW: Meteorological Week, Av.: Average, PDS: Per cent Disease Severity, Max.: Maximum, Min.: Minimum, Mor.: Morning, Eve.: Evening, * Sowing Date: 2.07.2018, * Mean of three replications

During *Kharif*, 2018 season (Table 1.) from sowing to physiological maturity of the okra crop, the major weather parameters prevailed were total rainfall 317.9 mm (7 rainy days), relative humidity RH-I in the range of 83.5-93.58 per cent and RH-II 33.03-81.48 per cent, temperatures maximum in the range of 24.38-35.2 °C and minimum in the range 16.25-23.36 °C. During the season, the disease appeared 1st at (36 MW) the okra cultivar Varsha uphar (4.04%), and on Parbhani Kranti (10.56%), which further progressed at steady rate and continued to increase upto physiological maturity of the crop.

The results (Table 2) indicated the correlation-coefficient between weather parameters and powdery mildew disease severity on two okra cultivars during *Kharif*, 2018. The study indicated that maximum and minimum temperature, RH-I and II, and wind velocity and rainfall were negatively correlated with the disease severity in all okra cultivars.

Table 2: Correlation-coefficient between weather parameters and powdery Mildew severity on okra cultivars during *Kharif*, 2018

Weather Parameters	Correlation Coefficient (r)	
	Varsha Uphar	Parbhani Kranti
Temperature (Max.) °C	-0.832	-0.867
Temperature (Min.) °C	-0.833	-0.867
Relative humidity (RH-I.) %	-0.766	-0.786
Relative humidity (RH-II) %	-0.827	-0.812
Wind velocity (km/hr)	-0.604	-0.552
Rainfall (mm)	-0.649	-0.666

Table value r at 5% = 0.553, * Crop sown on 2.07.2018

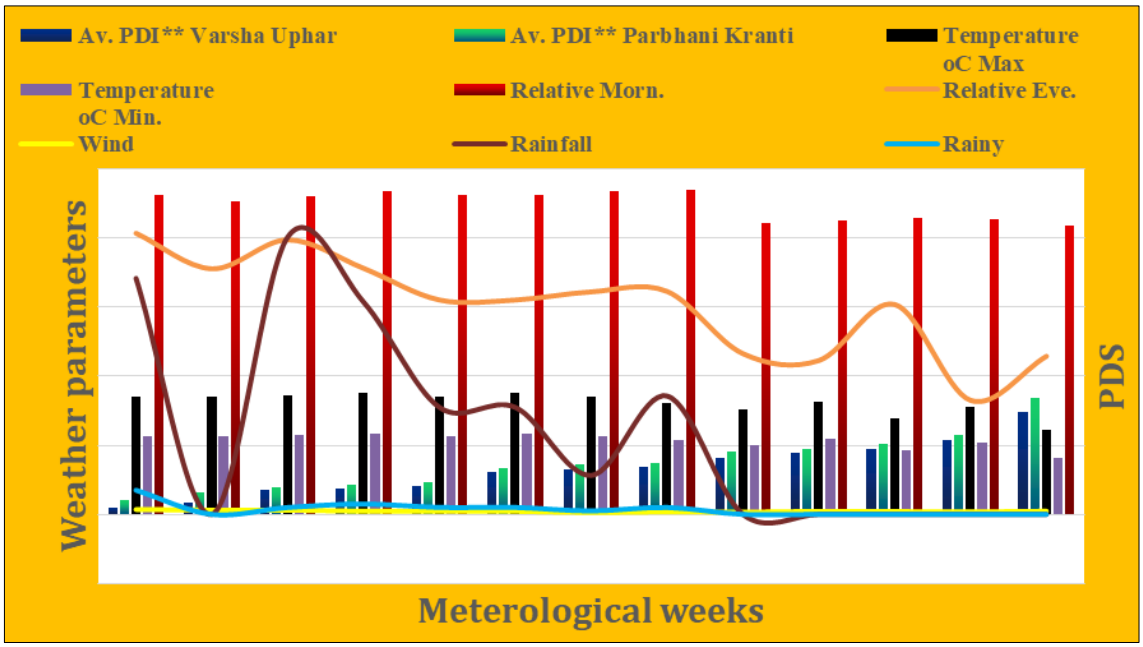

Fig 1: Effect of weather parameters on powdery mildew disease severity in okra cultivars during *Kharif*, 2018

Effect of weather parameters on okra powdery mildew severity during *Rabi*, 2019

During *Rabi*, 2019 season (Table 3.) from sowing to physiological maturity of the okra crop, the major weather parameters prevailed were relative humidity RH-I in the range of 82.0-90.03 per cent and RH-II 52.0-65.3 per cent, temperatures maximum in the range of 31.0-34.8 °C and minimum in the range 12.7-23.4 °C.

During the season, the disease appeared 1st at (7 MW) the okra cultivar Varsha uphar (3.31%), and on Parbhani kranti (6.56%), which further progressed at steady rate and continued to increase upto physiological maturity of the crop.

The results (Table 4.) indicated the correlation-coefficient between weather parameters and powdery mildew disease Severity on two okra cultivars during *Kharif*, 2019. The study indicated that maximum and minimum temperature and wind velocity and rainfall were positively correlated with the disease severity in all okra cultivars. However, maximum temperature (r value: 0.572 and 0.514) and minimum temperature (r value: 0.828 and 0.773) and wind velocity (r values: 0.826 and 0.790) were significant and positively correlated with the powdery mildew disease severity in all two okra cultivars *viz*., Varsha upha and Parbhani Kranti, respectively.

Table 3: Effect of weather parameters on powdery mildew disease severity in okra cultivars during *Rabi*, 2019

MW	Av. PDS		Temperature °C		Relative Humidity Morn.	Relative Humidity Eve.	Wind Velocity (Km/hr.)
	Varsha Uphar	Parbhani Kranti	Max.	Min.			
7	3.31	6.56	32.1	12.8	88.3	62.3	3.8
8	6.41	7.68	32.6	14.9	89	59.6	3.8
9	7.74	9.51	31.2	12.7	89.8	65.3	4.6
10	8.15	10.45	31	14	90.3	64.3	4.7
11	12.33	14.36	32.4	14.5	84.6	55.6	4.8
12	15.05	16.57	33	14.6	89.4	52	4.4
13	15.96	17.98	34.6	20.5	88.4	63.6	4.7
14	17.65	18.21	33.2	20.1	89.3	53.1	5
15	18.57	18.85	33.7	21.7	90.3	51.8	5.7
16	19.39	19.85	33.6	19.6	90.3	55.8	5.7
17	20.88	21.65	34.8	23.4	85.1	65.1	6
18	28.39	29.98	33	21.1	84.8	59.6	5.2
19	35.94	41.58	33.5	22.5	82	60.1	6.2

MW: Meteorological Week, Av.: Average, PDS: Per cent Disease Severity, Max.: Maximum, Min.: Minimum, Mor.: Morning, Eve.: Evening,* Sowing Date: 17.01.2019, * Mean of three replications

Thus, overall results indicated that temperatures (maximum and minimum), and wind velocity had significantly positive correlation development and spread of disease in okra crop.

Table 4: Correlation-coefficient between weather parameters and powdery mildew Severity* on okra cultivars during Summer, 2019

Weather Parameters	Correlation Coefficient (r)	
	Varsha Uphar	Parbhani Kranti
Temperature (Max.) °C	0.572	0.514
Temperature (Min.) °C	0.828	0.773
Relative humidity (RH-I.) %	-0.645	-0.701
Relative humidity (RH-II) %	-0.189	-0.128
Wind velocity (km/hr)	0.826	0.790

Table value r at 5% = 0.553, * Crop sown on 17.01.2019

These results of the present study are in conformity with earlier several workers Padgi (2016) [4] reported that relative humidity, rainfall, and rainy days had negative correlation with okra powdery mildew (*E. cichoracearum*) disease incidence and severity, except temperature maximum (0.891) and minimum (0.806), which were positively correlated with disease incidence / severity. Shah *et al*. (2016) [7] reported significant and positive correlation between temperature max. (36.6 - 44.7 °C) and min. (22.6 - 29.1 °C), whereas, relative humidity and rainfall were non-significant with sunflower powdery mildew (*E. cichoracearum*) disease development. Naik and Kulkarni (2018) reported that rate of disease development and severity as positively correlated with maximum temperature (0.606), whereas, minimum temperature (-0.471), morning relative humidity (-0.531) and evening relative humidity (-0.531), rainfall (-421) and rainy days were negatively correlated with per cent disease severity / intensity of cucumber powdery mildew (*E. cichoracearum*).

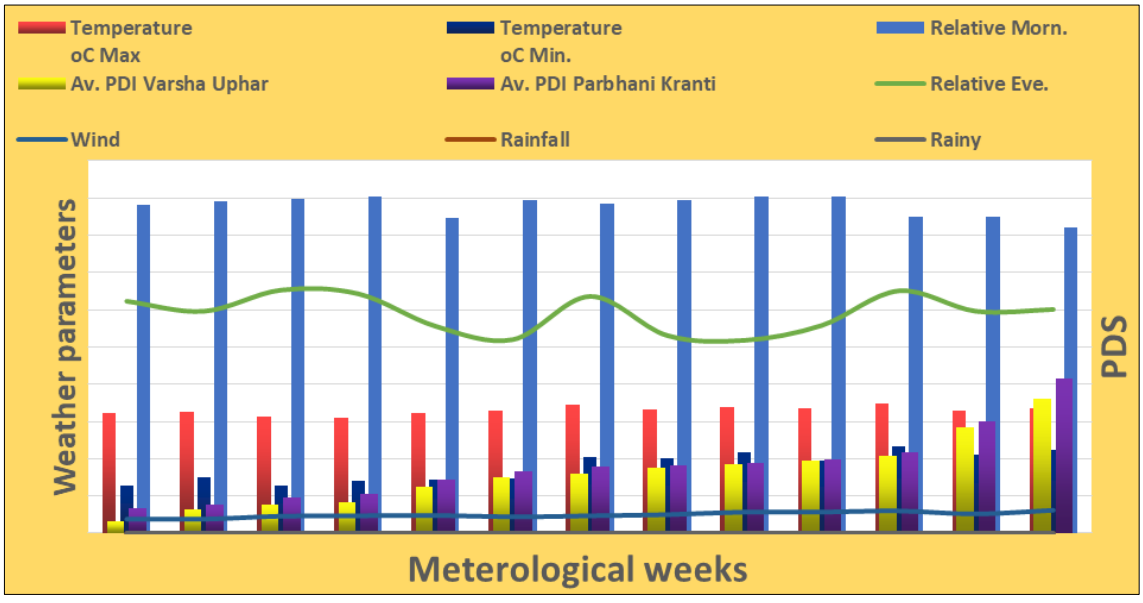

Fig 2: Effect of weather parameters on powdery mildew disease severity in okra cultivars during *Rabi*, 2019

Similar results on influence of weather parameters *viz*., temperature, relative humidity and rainfall on severity of powdery mildew (*E. cichoracearum)* disease in okra (Prabhu *et al*. 1971; Ramkrishnan 1976; Spencer 1978; Deka 1995; Band 2007; in sesamum Jagtap *et.al*. (2019) [5, 6, 8, 2, 1, 3].

References

1. Band SB, Khandge SV, Mahalle AM, Band AM. Effect of temperature and relative humidity on incidence of okra powdery mildew. J Pl. Dis. Sci. 2007;2(1):88-90.
2. Deka U. Validation of climatic disease severity values of powdery mildew (*E. cichoracearum* DC.) on okra (*A. esculentus*) under field conditions for forecasting outbreak of disease. M.Sc. (Agri.) Thesis, MPKV, Rahuri, Maharashtra; c1995. p. 103.
3. Jagtap SD, Game BC, More PE. Correlation of environmental factors with powdery mildew disease intensity on sesamum (*Sesamum indicum* L). Int. J Recent Sci. Res. 2019;10(11A):35772-35775.
4. Padgi KM. Studies on powdery mildew of okra caused by (*E. cichoracearum).* M.Sc. (Agri.) Thesis, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani; c2016.
5. Prabhu AS, Phatak KD, Singh RP. Powdery mildew of bhendi (*Abelmoschus esculentus*) in Delhi state. Indian J Hort. 1971;28:310-312.
6. Ramkrishnan L, Thamburaj SO, Kamalnath S. Incidence of powdery Mildew disease (*E. cichoracearum* DC.) on bhendi (*A. esculentus* (L.) Moench) in relation of climatic parameters and its influence on yield. Madras Agric. J. 1976;63(2):125-128.
7. Shah YA, Bugti GA, Feng LH, Bin W, Shah FA, Mari JM, *et al*. Epidemiology and management of powdery mildew of sunflower. J Ent. Zool. Stud. 2016;4(4):97-105.
8. Spencer DM. Epidemiology of powdery mildew: The Powdery Mildew, Academic Press; c1978. p. 111.
9. Naik PH, Kulkarni S. Studies on epidemiology and disease development of powdery mildew cucumber. Int. J Pure Appl. Biosci. 2018;6(3):483-489.