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Prevalence of collar rot of chilli caused by *Sclerotium rolfsii* Sacc. Under the agro-climatic zones of Marathwada region of Maharashtra

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Abstract
Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae is mainly cultivated for green fruits as table purpose and dry chilli as spice. Diseases of chilli act as the chief limiting factor to its economic production. Recently, the collar rot caused by *Sclerotium rolfsii* is becoming sever disease of chilli in India. Crop losses up to 16-80 per cent due to collar rot disease have been reported by many researchers in this crop. Hence, to get a preliminary idea regarding the incidence level and pattern of prevalence of the disease in the agro-climatic zones of Marathwada region of Maharashtra, a roving survey was conducted in eight districts at different locations of the aforesaid agro climatic zone during the crop growing season of *Kharif* 2016-17 and 2017-18. The pooled analysis of two years data revealed that disease incidence was ranged from 14.01 to 18.75 per cent in these zones and the Jalna district had maximum level of disease incidence (24.71%), followed by the districts *viz.*, Aurangabad (21.50 %), Nanded (18.15 %), Hingoli (16.43 %), Parbhani (15.24 %) and Latur (15.22 %). whereas, it was minimum in the districts of Beed (14.91 %). Maximum mean collar rot incidence was recorded on variety Arch-930 (23.47 %) while minimum incidence on variety Sitara (11.64 %). This study provided an elementay idea about the disease incidence pattern in these zone as well as paved the path for seeking resistance sources under local conditions and recommendation of proper farming practices to combat the drastic effects of collar rot disease.

Keywords: chilli, collar rot, *Sclerotium rolfsii*, agro-climatic zone, Marathwada

1. Introduction
Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae is mainly cultivated for green fruits as table purpose and dry chilli as spice and is popularly known as “red pepper” or “hot pepper” or “bell pepper”. Chilli crop suffers from a number of fungal, bacterial, nematode and many viral diseases. Recently, the collar rot caused by *Sclerotium rolfsii* is becoming sever disease of chilli in India. Crop losses up to 16-80 per cent due to collar rot disease have been reported by many researchers in this crop (Singh and Dhancholia, 1991[16]; Mathur and Gurjar, 2001) [10]. *S. rolfsii* is a soil borne facultative pathogen, belongs to the sub-division Deuteromycotina, which has wide host range of more than 500 species of cultivated and wild plants in tropical and sub-tropical regions (Punja, 1985 [12]; Xu, 2009 [20]; Hemanth *et al*., 2016 [5]). Hence, to get a preliminary idea regarding the incidence level and pattern of prevalence of the disease in the agro-climatic zones of Marathwada region of Maharashtra, a roving survey was conducted in eight districts at different locations of the aforesaid agro climatic zone during the crop growing season of *Kharif* 2016-17 and 2017-18.
The collar rot disease on solanaceous crop may occur at any growth stage of the plant (Begum *et al*., 1985) [3]. The collar rot affected plant shows invasion of the fungus, in the form of a girdle in the collar region, just above the soil line. The girdling progresses upwards, along with the white mycelium. Later on, cream to chocolate coloured sclerotia will be formed. Wilting occurs within 3-5 days and the entire plant dries up with the abolition of the green canopy. The dried leaves remain intact with the stem with poor root growth. The disease has been reported by many workers in different agro climatic zone of India. But accurate information of natural incidence level of the disease particularly in the agro-climatic zones of Marathwada region of Maharashtra is scanty. Inadequate knowledge about the incidence level of the disease, their distribution pattern etc. leads the indiscriminate use of pesticides. Therefore, the present study was carried to find out the occurrence and distribution pattern of collar rot disease of chilli in the agro-climatic zones of Marathwada region of Maharashtra.

2. Materials and Methods
To estimate the natural incidence of collar rot disease of chilli under the agro-climatic zones of Marathwada region of Maharashtra, roving surveys were carried out during the crop growing

season of *Kharif* 2016-17 and 2017-18 in 8 districts, which are distributed under three agro-climatic zones *viz.,* Scarcity zone (3), Assured rainfall zone (8) and Moderate rainfall zone (2) of Marathwada region of the Maharashtra where chilli crops was cultivated extensively by the farmers

In the fields of chilli crop, 10 m^2 area was randomly selected and observations on the incidence of collar rot disease was recorded. Per cent disease incidence was calculated by using the following formula.

$$\text{Disease incidence (\%)} = \frac{\text{No. of infected plants}}{\text{Total No. of plants examined}} \times 100$$

3. Results and Discussion

To obtain information on the natural incidence of collar rot of chilli, surveys were conducted during the growing season (*Kharif* 2016-17 and 2017-18) in eight districts having three agro-climatic zones *viz.,* Scarcity zone (3), Assured rainfall zone (8) and Moderate rainfall zone (2) of Marathwada region of the Maharashtra to record the incidence of the disease. The recorded data of disease incidence have been presented in the table 1, 2 and 3. It was evident from data presented in the tables that the incidence of collar rot disease of chilli varied with the location and season.

Agro-climatic zone wise chilli collar rot incidence in various agro climatic zones of Marathwada (Maharashtra)

Results (Table 1) revealed that maximum incidence of the disease was found in Assured rainfall zone (22.64 and 14.86 %) followed by Moderate rainfall zone (19.57 and 12.83 %) respectively, during *Kharif* 2016-17 and 2017-18. However, Scarcity zone recorded minimum incidence of the disease (17.43 and 10.58 %) during *Kharif* 2016-17 and 2017-18.

Table 1: Agro-climatic zone wise chilli collar rot incidence in various agro climatic zones of Marathwada (Maharashtra)

Sr. No.	Agro-climatic Zone	2016-17		2017-18		Mean Per cent incidence
		No. of fields	Incidence (%)	No. of fields	Incidence (%)	
1	Scarcity zone	18	17.43	18	10.58	14.01
2	Assured rainfall zone	162	22.64	171	14.86	18.75
3	Moderate rainfall zone	26	19.57	32	12.83	16.20
Mean of region		206	19.88	221	12.75	16.32

District-wise chilli collar rot incidence in various agro climatic zones of Marathwada (Maharashtra)

Results (Table 2) revealed that maximum average incidence of the disease was found in Jalna (29.24 and 20.17 %), Aurangabad (25.48 and17.51 %), Nanded (21.52 and 14.78 %), Hingoli (20.42 and 12.43 %), Latur (19.24 and 11.19 %), Parbhani (18.82 and 11.66 %) and Beed (18.57 and 11.24 %) respectively, during *Kharif* 2016-17 and 2017-18. However, Osmanabad district recorded minimum incidence of the disease (16.95 and 10.57 %) during *Kharif* 2016-17 and 2017-18.

The pooled mean (*Kharif*, 2016-17 and 2017-18) results revealed maximum mean collar rot incidence was recorded in Jalna district (24.71%), followed by the districts *viz*., Aurangabad (21.50 %), Nanded (18.15 %), Hingoli (16.43 %), Parbhani (15.24 %) and Latur (15.22 %); whereas, it was minimum in the districts of Beed (14.91 %).

Table 2: District-wise chilli collar rot incidence in various agro climatic zones of Marathwada (Maharashtra)

Sr. No.	District	2016-17		2017-18		Mean Per cent incidence
		No. of fields	Incidence (%)	No. of fields	Incidence (%)	
1	Aurangabad	28	25.48	26	17.51	21.50
2	Beed	24	18.57	21	11.24	14.91
3	Hingoli	13	20.42	14	12.43	16.43
4	Jalna	30	29.24	30	20.17	24.71
5	Latur	24	19.24	21	11.19	15.22
6	Nanded	43	21.52	52	14.78	18.15
7	Osmanabad	18	16.95	23	10.57	13.76
8	Parbhani	26	18.82	34	11.66	15.24
	Mean	206	21.28	221	13.69	17.49

Variety-wise chilli collar rot incidence in Marathwada (Maharashtra)

Result (Table 3) revealed that maximum disease incidence was found on variety Arch-930 (28.85 and 18.08 %), respectively, during *Kharif*, 2016-17 and 2017-18, followed by Pragati (24.79 %), Teja-4 (24.59 %), KSP-1194 (22.14 %), Parbhani Tejas (20.04 %), Amulya (19.18 %), Garima (18.72 %), Green gold (18.34 %), Pusa Jwala (15.87 %), Local (15.13 %) and Sitara (14.71 %) respectively, during *Kharif* 2016-17. While during *Kharif* 2017-18 season, Arch-930 (18.08 %), Teja-4 (14.28 %), Pragati (14.01 %), KSP-1194 (13.10 %), Garima (13.10 %), Parbhani Tejas (12.39 %), Amulya (12.17 %), Green gold (10.44 %), Pusa Jwala (10.43 %) and Tokita (9.15 %). However, variety Tokita (14.64 %) and Sitara (8.56 %) recorded minimum collar rot incidence respectively, during *Kharif*, 2016-17 and 2017-18.

The pooled mean (*Kharif*, 2016-17 and 2017-18) results revealed maximum mean collar rot incidence was recorded on variety Arch-930 (23.47 %) followed by Teja-4 (19.44 %), Pragati (19.40 %), KSP-1194 (17.62 %), Parbhani Tejas (16.22 %), Garima (15.91 %), Amulya (15.68 %), Green gold (14.39 %), Pusa Jwala (13.15 %), Local (12.07 %) and Tokita (11.90 %); whereas, it was minimum on variety Sitara (11.64 %).

Table 3: Variety-wise chilli collar rot incidence in Marathwada (Maharashtra)

Sr. No.	Varieties/ hybrids	2016-17		2017-18		Mean Per cent incidence
		No. of fields	Incidence (%)	No. of fields	Incidence (%)	
1	Amulya	15	19.18	12	12.17	15.68
2	Arch-930	35	28.85	48	18.08	23.47
3	Garima	20	18.72	15	13.10	15.91
4	Green gold	11	18.34	10	10.44	14.39
5	KSP-1194	9	22.14	10	13.10	17.62
6	Local	5	15.13	4	9.00	12.07
7	Parbhani Tejas	3	20.04	4	12.39	16.22
8	Pragati	31	24.79	37	14.01	19.40
9	Pusa Jwala	9	15.87	10	10.43	13.15
10	Sitara	30	14.71	35	8.56	11.64
11	Teja-4	15	24.59	15	14.28	19.44
12	Tokita	23	14.64	21	9.15	11.90
		206	19.75	221	12.06	15.90

Banyal *et al*., (2008) [2] reported collar rot of tomato (*Sclerotium rolfsii*) is one of the major threats in Himachal Pradesh, India, with an incidence of 10-45 per cent. Thiribhuvanamala *et al*. (1999) [18] observed that 30 per cent of crop loss in tomato was due to S. rolfsii. Ingale and Mayee, (1986) [6] reported that 25 per cent of seedling mortality in the cultivar JL-24 of Groundnut at Parbhani due to *S. rolfsii*. In Chickpea, upto 30 percent disease incidence reported in Jabalpur by Padole *et al*. (2009) [11]. In Saurashtra, Gujarat, 30-40% seedling rot reported on garlic (Lukose *et al*., 2003) [7]. These results of the present studies on occurrence and distribution of chilli collar rot are similar to those reported earlier by several workers on chilli and other solanaceous crops (Ramakrishnan *et al*. 1955 [15], Wangihar *et al*., 1988 [19]; Singh and Dhancholia, 1991 [16]; Abeysinghe, 2009 [1]; Chaurasia *et al*., 2014 [4]; Raghu and Benagi, 2014 [13] and Mahato *et al*., 2017 [9]).

The results obtained in this experimental study revealed that the collar rot of chilli caused by *Sclerotium rolfsii* was prevalent in all the eight districts of Marathwada comparing three agro-climatic zones. Among the three agro-climatic zones of Marathwada region of Maharashtra, the Assured rainfall zone showed maximum prevalence of collar rot (18.75 %) whereas minimum (14.01 %) prevalence was recorded in Scarcity zone. The higher range of soil and atmospheric temperature, rainfall and continuous cultivation of susceptible cultivars over years were responsible for high prevalence of collar rot in these locations. The finding emphasizes on seeking new resistance sources under local conditions and encouraging of sowing resistance cultivars by following good management practices.

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