Original Research Article

Survey for severity of peduncle blight and anthracnose of tuberose in northern part of Karnataka

Abstract:

A roving survey was carried out in major affected areas of northern Karnataka. From the results obtained, it was clear that, vegetative state is more vulnerable to the attack of the pathogens then flowering stage irrespective of the locations. Red soil type recorded higher disease severity as compared to black soil. Among the surveyed areas, the severity of peduncle blight of tuberose was maximum in Tumminakatti village (45.33 %) of Haveri district while anthracnose severity was maximum in Saidapur farm (31.11%) of Dharwad district. Least disease severity of peduncle blight and anthracnose was recorded in Chandanamatti (13.33 %) and Nigadi (6.67 %) villages of Dharwad taluk of Dharwad district respectively.

1. INTRODUCTION

Tuberose (*Polianthes tuberosa* L.) is the most important plant for the cultivation of long term spikes under tropical and subtropical ornamental bulbous flowers. It is entitled to be “king of flowers”. It is famous for its elegant appearance and sweet fragrance (1). In world, more than 90 countries are involved in commercial flower production. The estimated world floriculture products to hover around 20 billion dollars (6). The Netherlands, United states and Japan are the leading producer in the world. China and India are dominant in terms of area under flower cultivation (9).

In India the area under tuberose cultivation is 16.19 thousand hectares with a production of 107.91 thousand metric tonnes of loose flowers and 89.29 thousand metric tonnes of cut flowers. Among Indian states, Karnataka ranks fourth in area and third in production after West Bengal, Tamil Nadu and Andhra Pradesh. The area under tuberose cultivation in Karnataka is 2.19 thousand hectares with a production of 17.43 thousand metric tonnes of loose flowers and

3.71 thousand metric tonnes of cut flowers (2). In recent days two new diseases *viz.,* Peduncle blight and Anthracnose is causing severe yield loss in northern Karnataka. Peduncle blight caused by *Lasiodiplodiatheobromae* causes 40 to 60 per cent yield loss. Whereas in favourable condition extends up to 92 per cent (3). The anthracnose caused by *Colletotrichum gloeosporiodes* severity is ranges from 18-27 per cent (4).

This was the first attempt to record the severity of peduncle blight and anthracnose of tuberose in northern Karnataka, because these foliar diseases are causing enormous yield loss and there is no information available on the severity of these diseases in this region.

2. MATERIALS AND METHODS:

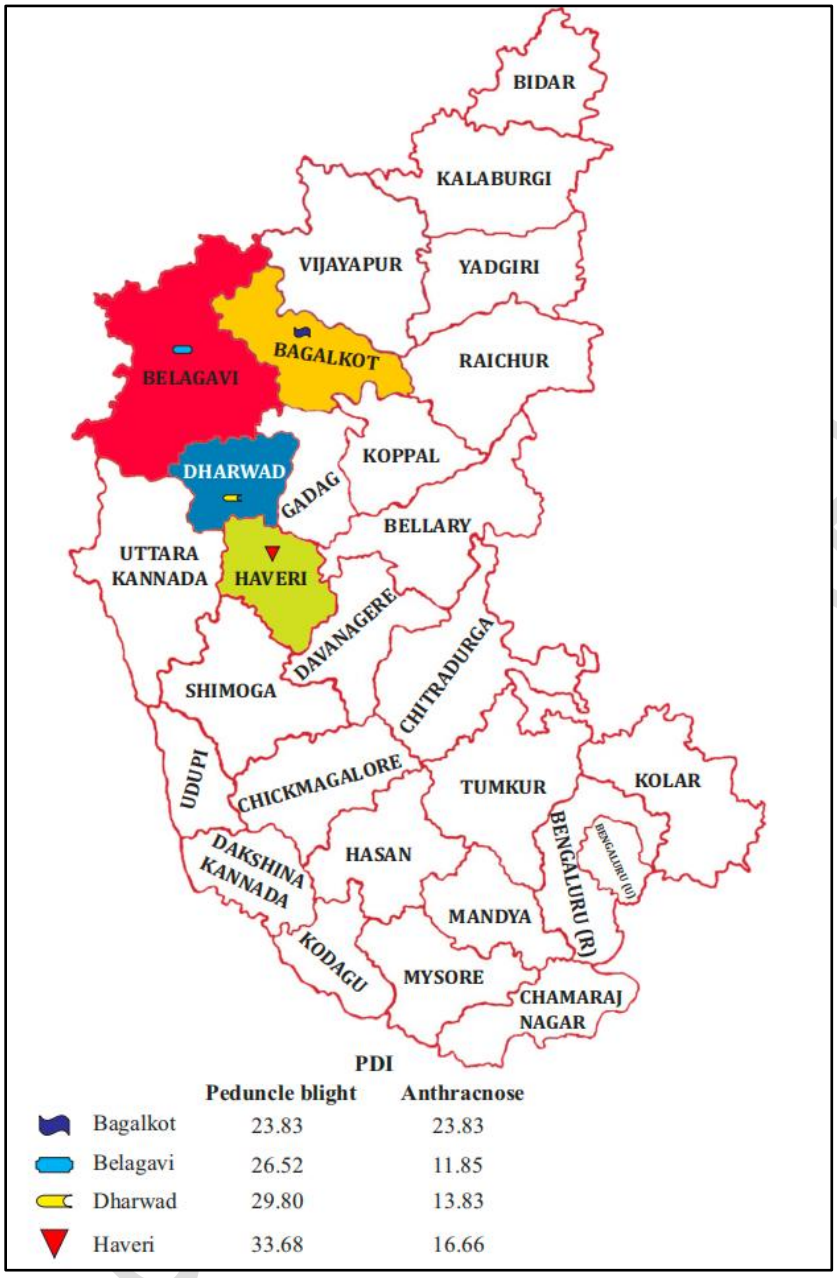
Roving survey was conducted during *kharif* 2019 cropping season to know the prevalence and severity of major fungal foliar diseases of tuberose in major districts of northern Karnataka *viz.,* Belagavi, Bagalkot, Dharwad and Haveri (Fig 1). The observations on disease severity, stage of the crop, variety and other details were recorded. The fields were selected randomly in a village on the survey route. In each field, plants were selected at random. The infected leaf samples were observed to know the severity of the disease. The peduncle blight was recorded and grouped as per following grade system developed by (7). The anthracnose disease was recorded and grouped as per following grade system given by Mayee and Datar (5). The recorded grades were converted into per cent disease index (PDI) by using the formula given by Wheeler (8).

$$\text{Per cent Disease Index (PDI)} = \frac{\text{Sum of the all individual disease ratings}}{\text{Total number of leaves observed} \times \text{Maximum grade}} \times 100$$

List 1. Disease scale for peduncle blight

Rating	Symptoms
0	No infection
1	1-10 % dark brown necrotic area on leaf
3	11-25 % dark brown necrotic area on leaf
5	26-50 % dark brown necrotic area on leaf

7	51-75 % dark brown necrotic area on leaf
9	76-100 % dark brown necrotic area. Defoliation of leaves



	Peduncle blight	Anthracnose
Bagalkot	23.83	23.83
Belagavi	26.52	11.85
Dharwad	29.80	13.83
Haveri	33.68	16.66

Fig 1: Peduncle blight and anthracnose of tuberose in northern parts of Karnataka during *kharif* 2019

List 2. Diseases scale for anthracnose

Rating	Symptoms
0	No symptoms on leaf
1	Small pinhead sized lesions covering less than 1 % of leaf area
3	Small pinhead sized lesions covering less than 1-10 % of leaf area
5	Lesions big but not coalescing covering 11-25 % of leaf area
7	Lesions on leaves covering 26-50 % leaf area
9	Lesions on leaves covering 51 % or more area. Defoliation of leaves

3. RESULTS AND DISCUSSION

The survey for the severity of peduncle blight and anthracnose was conducted during *kharif* 2019 in four districts of northern Karnataka *viz.*, Bagalkot, Belagavi, Dharwad and Haveri (Table 1). the typical symptoms of peduncle blight and anthracnose was seen in surveyed plots (Fig 2). The severity of peduncle blight of tuberose varied from 13.33 to 45.33 per cent in the surveyed districts. Maximum severity of peduncle blight was noticed in Haveri district (33.68 %) followed by Dharwad (29.80 %) and Belagavi (26.52 %). Mean minimum PDI was recorded in Bagalkot (23.83 %) district. Among different taluks surveyed, mean maximum severity was recorded in Ranebennur (39.00 %) taluk of Haveri district followed by Kalghatagi (34.22 %) taluk of Dharwad district. Least mean disease severity was recorded in Hunagund (20.22 %) taluk of Bagalkot district. Among the different villages surveyed Tumminakatti (45.33 %) followed by Sangapura (44.00 %) village of Ranebennur taluk and both showed maximum disease severity in Haveri district. Least disease severity was recorded in Chandanamatti (13.33 %) village of Dharwad taluk of Dharwad district.

The severity of anthracnose of tuberose varied from 6.67 to 31.11 per cent in the surveyed districts. Maximum severity of anthracnose was noticed in Bagalkot district (23.83 %) followed by Haveri (16.66 %) and Dharwad (13.83 %). Mean minimum PDI was recorded in Belagavi (11.85 %) district. Among different taluks surveyed, mean maximum severity was

recorded in Bilagi (26.44 %) taluk followed by Mudhol (24.44 %) taluk of Bagalkot district. Least mean disease severity was recorded in Gokak (20.22 %) taluk of Belagavi district.

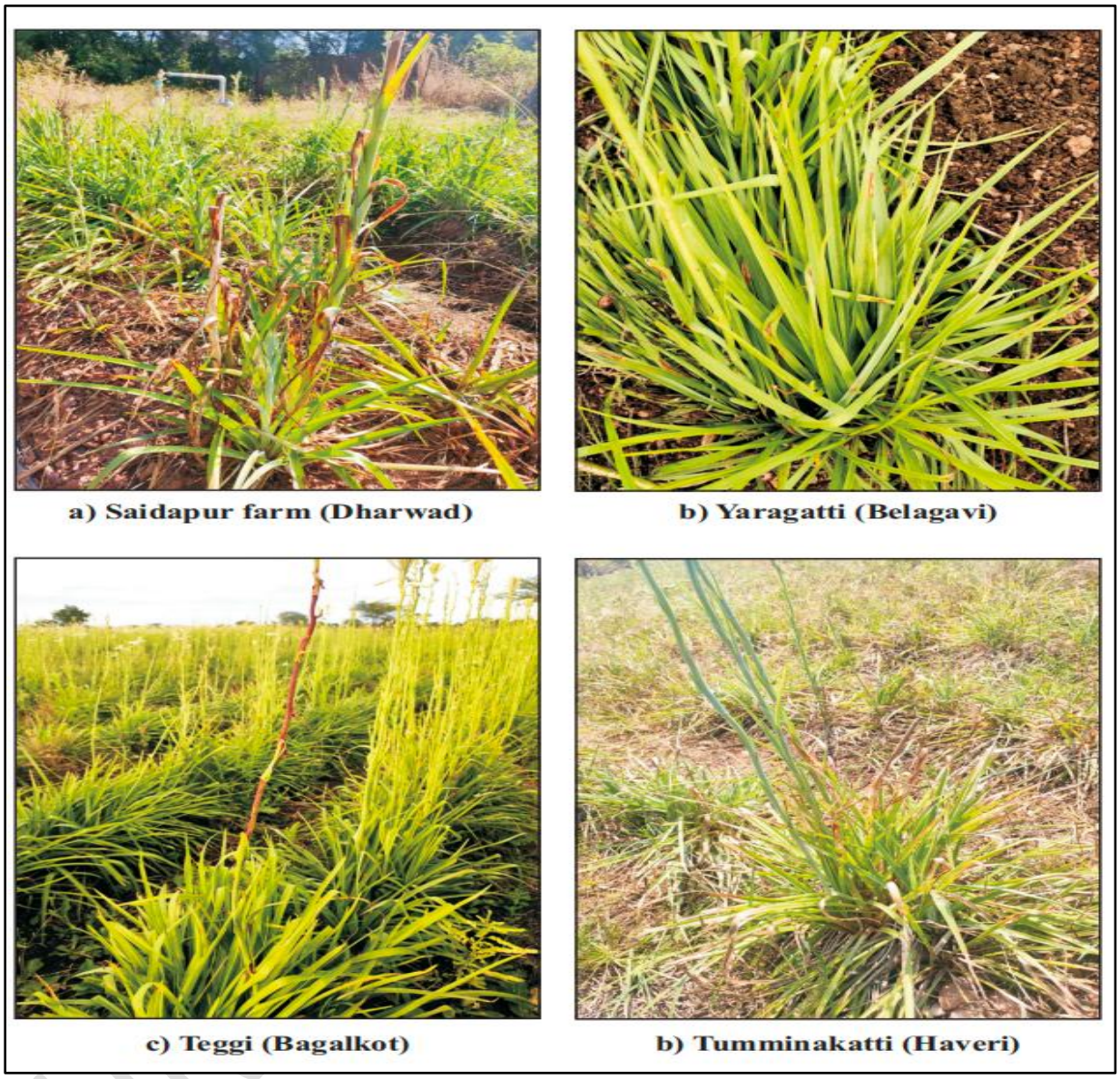


Fig 2:Symptoms of peduncle blight and anthracnose of tuberose in northern parts of Karnataka during ***kharif*** 2019

Among the different villages surveyed Saidapur farm (31.11 %) of Dharwad taluk followed by Tumminakatti (24.00 %) village of Ranebennur taluk of Haveri district recorded maximum severity. Least disease severity was recorded in Nigadi (6.67 %) village of Dharwad taluk of Dharwad district.

From the study it was identified that Tumminakatti village of Ranebennur taluk in Haveri district is the hot spot for peduncle blight of tuberose with PDI of 45.33 per cent. For anthracnose disease Saidapur farm of Dharwad taluk of Dharwad district is the hotspot with PDI of 31.11 per cent.

The variation in the severity of peduncle blight and anthracnose of tuberose with respect to type of soil were studied. The results confirmed that between red and black soil, the disease severity was higher in red soil for both the diseases [Peduncle blight (31.85 %) and anthracnose (14.67 %)] as compared to black soil [Peduncle blight (28.30 %) and anthracnose (13.79 %)] (Table 2). Red soil type recorded higher disease severity as compared to black soil because red soil supports saprophytic ability of the pathogen and less moisture holding capacity. Due to less moisture holding capacity the frequency of the irrigation will increase which in turn increases the relative humidity which favours the development of the disease.

In survey it was found that the severity of the peduncle blight and anthracnose of tuberose was higher at vegetative stage *i.e.* 29.75 and 13.99 per cent as compared to flowering stage *i.e.* 28.80 and 13.88 per cent respectively (Table 3). It could be due to, at initial stages of crop growth the plants are more susceptible and disease resistance ability will be less and farmers take up control measure only when it damages the main economical part *i.e.*, flower or when flower yield gets reduced so the disease will be less at flowering stage.

The results are in agreement with Durgadevi and Shankaralingam (2012) where they carried out a survey during 2010 in Madurai and Dindigal districts of Tamil Nadu state. Tuberose was found to exhibit leaf blight and blossom blight followed by peduncle dieback starting from the tip. When infection occurred on blossoms it led to a total loss of flower buds. Peduncle blight per cent disease incidence ranged from 12 to 42.7 per cent.

Table 1. Survey for the severity of peduncle blight and anthracnose disease of tuberose in northern Karnataka during *kharif* 2019

a) Bagalkot district

Sl. No.	Name of the Taluk	Name of the Village	Area (In Acre)	Soil Type	Rainfed/ Irrigated	Variety	Stage of the crop	Diseases Noticed	PDI of peduncle blight disease	PDI of Anthracnose disease
1	**Bagalkot**	**Benakatti**	1.00	Black	Irrigated	Local	Flowering	Peduncle blight, anthracnose and tuber rot	18.67	8.00
		Shirur	0.50	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	29.78	12.44
								Taluk mean PDI	**24.22**	**10.22**
2	**Bilagi**	**Shivapur**	0.50	Red	Irrigated	Local	Flowering	Peduncle blight, anthracnose and fusarium wilt	16.44	7.11
		Teggi	0.50	Red	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	36.44	16.00
								Taluk mean PDI	**26.44**	**11.56**
3	**Hunagund**	**Amaravatti**	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	17.33	10.67
		Dannur	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	23.11	12.89
								Taluk mean PDI	**20.22**	**11.78**
4	**Mudhol**	**Hulyal**	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight, anthracnose	32.44	14.67
		Kulali	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	16.44	8.44
								Taluk mean PDI	**24.44**	**11.56**
								District mean PDI	**23.83**	**11.27**

b) Belagavi district

Sl. No.	Name of the Taluk	Name of the Village	Area (In Acre)	Soil Type	Rainfed/ Irrigated	Variety	Stage of the crop	Diseases Noticed	PDI of peduncle blight disease	PDI of Anthracnose disease
1	Belagavi	**Desur**	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	23.11	8.44
		Devagiri	0.50	Black	Irrigated	Local	Flowering	Peduncle blight, anthracnose and fusarium wilt	30.22	11.56
		Ambevadi	0.50	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	27.56	14.67
								Taluk mean PDI	**26.96**	**11.56**
2	Gokak	**Arabhavi**	0.50	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	15.11	7.56
		Ghataprabha	1.00	Black	Irrigated	Local	Flowering	Peduncle blight, anthracnose and stem rot	24.89	10.22
		Yogikolla	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	32.44	12.89
								Taluk mean PDI	**24.15**	**10.22**
3	Savadatti	**Yaragatti**	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	33.78	14.22
		Benakatti	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	30.22	16.00
		Rainapura	0.50	Black	Irrigated	Local	Flowering	Peduncle blight, anthracnose	21.33	11.11
								Taluk mean PDI	**28.44**	**13.78**
								District mean PDI	**26.52**	**11.85**

c) Dharwad district

Sl. No.	Name of the Taluk	Name of the Village	Area (In Acre)	Soil Type	Rainfed/ Irrigated	Variety	Stage of the crop	Diseases Noticed	PDI of peduncle blight disease	PDI of Anthracnose disease
1	Dharwad	**Chandanamatti**	1.00	Black	Irrigated	Local	Flowering	Peduncle blight, anthracnose and sclerotium wilt	13.33	9.33
		Hebballi	0.50	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	22.22	8.89
		Kanakur	0.50	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	35.56	20.00
		Kavalgeri	0.50	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	28.89	11.11
		Nigadi	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	20.00	6.67
		Saidapur farm	0.5	Black	Irrigated	Prajwal	Flowering	Peduncle blight and anthracnose	24.44	31.11
								Taluk mean PDI	**24.07**	**14.52**
2	Kalghatagi	**Bagenerikoppa**	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	40.44	16.00
		Begur	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	36.89	14.67
		Kuruvinakoppa	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	25.33	10.22
								Taluk mean PDI	**34.22**	**13.63**
3	Kundgol	**Attigeri**	0.50	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	28.89	11.11
		Gudageri	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	33.33	15.56
								Taluk mean PDI	**31.11**	**13.33**
								District mean PDI	**29.80**	**13.83**

d) Haveri district

Sl. No.	Name of the Taluk	Name of the Village	Area (In Acre)	Soil Type	Rainfed/ Irrigated	Variety	Stage of the crop	Diseases Noticed	PDI of peduncle blight disease	PDI of Anthracnose disease
1	Byadgi	**Chikkabasuru**	1.00	Red	Rainfed	Local	Flowering	Peduncle blight and anthracnose	27.56	12.89
		Kaginele	0.50	Red	Irrigated	Local	Flowering	Peduncle blight and anthracnose	30.22	14.67
		Malluru	0.50	Red	Irrigated	Local	Flowering	Peduncle blight and anthracnose	36.44	17.78
								Taluk mean PDI	**31.41**	**15.11**
2	Hirekerur	**Aladageri**	0.50	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	36.89	19.56
		Haunsabhavi	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	28.89	15.11
		Chikkenur	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	32.00	16.89
								Taluk mean PDI	**32.59**	**17.19**
3	Ranebennur	**Asundi**	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	32.44	16.44
		Halageri	1.00	Black	Irrigated	Local	Vegetative	Peduncle blight and anthracnose	34.22	16.89
		Sangapura	0.50	Red	Irrigated	Local	Flowering	Peduncle blight and anthracnose	44.00	19.56
		Tumminakatti	1.00	Black	Irrigated	Local	Flowering	Peduncle blight, anthracnose	45.33	24.00
								Taluk mean PDI	**39.00**	**19.22**
4	Rattihalli	**Hullatti**	1.50	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	30.67	14.67
		Kaduru	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	29.78	12.89
		Kudupali	1.00	Black	Irrigated	Local	Flowering	Peduncle blight and anthracnose	34.67	17.78
								Taluk mean PDI	**31.70**	**15.11**
								District mean PDI	**33.68**	**16.66**

Table 2: Severity of peduncle blight of tuberose in different soil type and crop stage during *kharif* 2019

Mean	Soil type		Crop stage	
	Black	Red	Vegetative stage	Flowering stage
Per cent disease index (PDI)	28.30	31.85	29.75	28.80

Table 3: Severity of anthracnose of tuberose in different soil type and crop stage during *kharif* 2019

Mean	Soil type		Crop stage	
	Black	Red	Vegetative stage	Flowering stage
Per cent disease index (PDI)	13.79	14.67	13.99	13.88

Similar kind of results were obtained by Mahadevakumar*et al.* (2019) where they conducted a survey in Southern parts of Karnataka for the disease prevalence of anthracnose of tuberose. The disease incidence ranged from 18 to 27 per cent. Among the different taluks surveyed highest disease incidence was observed in T. Narsipura (27 %) followed by Nanjangud (22 %). Kollegal (18 %) recorded lowest disease incidence.

Conclusion: Maximumdisease severity of peduncle blight and anthracnose was recorded in Haveri and Bagalkot district respectively. Least severity of peduncle blight and anthracnose was recorded in Bagalkot district. The severity of peduncle blight and anthracnose was more in red soils as compared to black soil and the vegetative stage is more prone to diseases then flowering stage.

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