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## Prevalence and incidence of turicum leaf blight disease of maize caused by *Exserohilum turcicum* (Pass.) Leonard and Suggs

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### Abstract

Maize is considered to be the third most important cereal after rice and wheat in India. It is being cultivated worldwide in a wider range of environmental conditions, due to its greater adaptability. It is known to be affected by more than 62 diseases. Among them, turicum leaf blight caused by *Exserohilum turcicum* (Pass.) Leonard and Suggs is of significant importance as it drastically reduces the yield by reducing photosynthetic activity of the plant. Hence, in order to know the disease occurrence and extent of its severity, an extensive roving survey was conducted in Shivamogga and Davanagere districts. The highest percent disease index (PDI) was recorded in Honnali taluk of Davanagere district (61.28) as against least in Soraba taluk of Shivamogga district (18.55).

**Keywords:** Turicum leaf blight, maize, disease, survey

### 1. Introduction

Maize (*Zea mays* L.) is one of the most important cereal crop belongs to the family Poaceae. It is grown worldwide in a wider range of environments because of its greater adaptability. It is recognized globally as "Queen of cereals" because of its higher yield potential compared to other cereals. Maize ranks the third position next to wheat and rice in the world with respect to the area, while its productivity surpasses all other cereal crops. In India, maize is the third most important cereal crop after rice and wheat (Anon., 2016) [1].

Globally, maize occupies an area of 177 million hectares with a production of 967 million tonnes with productivity of 4,920 kg ha<sup>-1</sup> (Anon., 2017) [2]. In India, maize occupies an area of 8.69 million hectares, with the production of 21.80 million tonnes and has average productivity of 2,500 kg ha<sup>-1</sup>. In Karnataka, it occupies an area of 1.17 million hectares with a production of 3.26 million tonnes and productivity of 2,700 kg ha<sup>-1</sup> (Anon., 2017) [2].

Maize is known to be affected by more than 62 diseases caused by various plant pathogens. Northern corn leaf blight or Turicum Leaf Blight (TLB) disease has emerged as one of significant limiting factors for maize production, affecting photosynthesis with a severe reduction in grain yield to an extent of 28 to 91 percent (Jakhar *et al.*, 2017) [4]. This is one of the ubiquitous foliar disease of maize caused by an ascomycete fungi, *Setosphaeria turcica* [Luttrell] (Anamorph: *Exserohilum turcicum* (Pass.) Leonard and Suggs).

For a successful management of any disease, there is a need to know the disease prevalence in different crop growing areas. This could be achieved through conducting field surveys. Hence a survey was undertaken to know the present status of this disease in major maize growing areas of Shivamogga and Davanagere districts.

### 2. Material and Methods

A systematic intensive roving survey was conducted to assess occurrence and the incidence of turicum leaf blight disease in Shivamogga and Davanagere districts during *Kharif*-2019. In each district, three taluks were selected and in each taluk, three villages were identified and in each village, five fields were surveyed. During the survey, in each field, 50 plants were randomly selected and the severity of the disease was recorded by following 1 to 9 scale given by Mayee and Datar (1986) [8]. Later the percent disease index (PDI) was calculated by the formula given by Wheeler (1969) [10]

$$PDI = \frac{\text{Sum of all individual disease rating}}{\text{A total number of leaves examined} \times \text{Maximum grade value}} \times 100$$

**Table 1:** The modified disease rating scale for TLB (Mayee and Datar, 1986) <sup>[8]</sup>

Rating scale	Degree of infection	Disease reaction
1	Nil to very slight infection ( $\leq 10\%$ )	Resistant (Score: $\leq 3.0$ )
2	Slight infection, a few lesions scattered on two lower leaves (10.1-20%)	
3	Light infection, a moderate number of lesions scattered on four lower leaves (20.1-30%)	
4	Light infection, a moderate number of lesions scattered on lower leaves, a few lesion scattered on middle leaves below the cob (30.1-40%)	Moderately resistant (Score: 3.1-5.0)
5	Moderate infection, an abundant number of lesions scattered on lower leaves, moderate number of lesions scattered on middle leaves below the cob (40.1-50%)	
6	Heavy infection, an abundant number of lesions scattered on lower leaves, moderate infection on middle leaves and a few lesions on two leaves above the cob (50.1-60%)	Moderately susceptible (Score: 5.1-7.0)
7	Heavy infection, an abundant number of lesions scattered on lower and middle leaves and a moderate number of lesions on two to four leaves above the cob (60.1-70%)	
8	Very heavy infection, lesions abundant scattered on lower and middle leaves and spreading to the flag leaf (70.1-80%)	Susceptible (Score: $>7.0$ )
9	Very heavy infection, lesions abundant scattered on almost all the leaves, plant prematurely dried and killed ( $>80\%$ )	

### 3. Results

A systematic roving survey was undertaken to record the occurrence and incidence of turicum leaf blight (TLB) and other foliar diseases prevailing on maize during *Kharif-2019* in Shivamogga and Davanagere districts of Karnataka. The data on PDI, agroclimatic zone, soil type, cultivar grown, crop grown condition (Irrigated/Rainfed), crop stage, other diseases noticed and latitude and longitude were collected.

The percent disease index (PDI) in the studied area was varied from 10 to 70 percent. The highest PDI was recorded in Gantypura village of Honnali taluk, Davanagere district (69.85), followed by Kunchenahalli village of Shivamogga taluk (63.27) and Taraganahalli village of Honnali taluk,

Davanagere district (62.36). Whereas, the lowest PDI was recorded in Ulavi village of Soraba taluk, Shivamogga district (12.38) (Table 2).

Among the different taluks surveyed, the PDI was ranged between 18 to 62. The highest PDI (61.28) was recorded in Honnali taluk of Davanagere district followed by Shikaripura taluk of Shivamogga district and Shivamogga taluk with a mean PDI of 44.64 and 43.54 respectively. The lowest PDI (18.55) was recorded in Soraba taluk of Shivamogga district. Among the two districts surveyed, the higher percent disease index was recorded in Davanagere than Shivamogga district with a mean PDI of 43.15 and 35.58, respectively (Table 3 and Fig 1).

**Table 2:** Roving survey for the incidence of turicum leaf blight of maize in Shivamogga and Davanagere districts during *Kharif-2019*

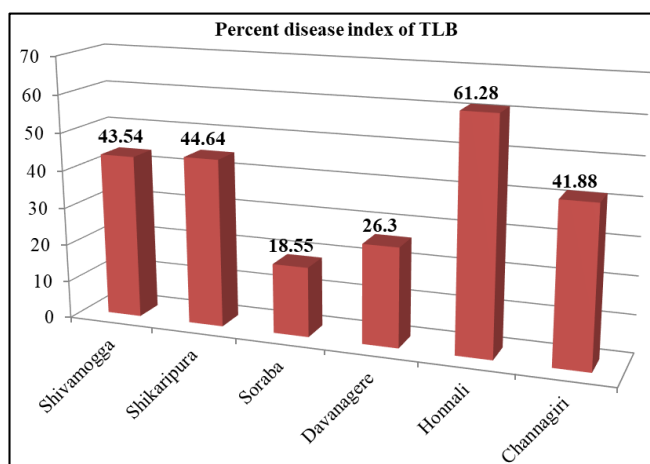
District	Taluk	Village	Agroclimatic zone	Soil type	Cultivar grown	Crop grown condition (Irrigated/ Rainfed)	Crop stage	Percent disease index	Other diseases observed	Latitude (°N) and Longitude (°E)
Shivamogga	Shivamogga	Abbalagere	Southern transition zone	Red	C.P. 818	Rainfed	Grain filling	30.61	MLB	14.0006153 75.589699
		Honnabile	Southern transition zone	Red	C.P. 818	Irrigated	Vegetative	36.75	MLB, BLSB	13.897259 75.653049
		Kunchenahalli	Southern transition zone	Red	C.P. 818	Rainfed	Grain filling	63.27	MLB	14.055993 75.547651
		Mean							43.54	
	Shikaripura	Bellagutti	Southern transition zone	Black	C.P. 818	Rainfed	Grain filling	43.68	MLB	14.187901 75.52068
		Udugoni	Southern transition zone	Black	C.P. 818	Irrigated	Grain filling	49.25	MLB, CLS	14.318079 75.505598
		Kenchikoppa	Southern transition zone	Black	D.K.C. 9126	Rainfed	Grain filling	40.98	MLB	14.188264 75.265824
		Mean							44.64	
	Soraba	Ulavi	Hilly zone	Red	Proline	Rainfed	Dough	12.38	MLB	14.270403 75.10733
		Mudi	Hilly zone	Red	D.K.C. 9126	Rainfed	Silking	16.93	MLB	14.621639 75.200698
		Yennekoppa	Hilly zone	Red	C.P. 828	Rainfed	Silking	26.34	CLS, MLB	14.54438 75.206201
		Mean							18.55	

District	Taluk	Village	Agroclimatic zone	Soil type	Cultivar grown	Crop grown condition (Irrigated/ Rainfed)	Crop stage	Percent disease index	Other diseases observed	Latitude (°N) and Longitude (°E)
Davanagere	Davanagere	Kukkavada	Central dry zone	Black	C.P. 818	Rainfed	Grain filling	29.21	MLB	14.329983 75.88736
		Mallekatte	Central dry zone	Red	Hi-tech	Irrigated	Grain filling	22.86	MLB	14.487569 75.050057
		Kariganuru cross	Central dry zone	Red	C.P. 818	Rainfed	Vegetative	26.84	MLB	14.312443 75.881182
		Mean							26.30	
	Honnali	Gantapur	Southern transition zone	Red	C.P. 818	Rainfed	Grain filling	69.85	CLS, MLB	14.717793 75.717793
		Taraganahalli	Southern transition zone	Red	Srikar 3033	Rainfed	Grain filling	62.36	MLB	14.258484 75.712265
		Kamaragatte	Southern transition zone	Black	C.P. 828	Rainfed	Dough	51.64	MLB	14.224296 75.707944
		Mean							61.28	
	Channagiri	Hiruvada tanda	Southern transition zone	Red	C.P. 818	Rainfed	Dough	45.32	CLS, MLB	14.084815 75.943321
		Sulekere	Southern transition zone	Red	C.P. 818	Irrigated	Dough	40.67	MLB	14.137253 75.875477
		Thyavanigi	Southern transition zone	Red	Srikar 3033	Irrigated	Grain filling	39.64	CLS, MLB	14.253493 75.884957
		Mean							41.88	

MLB - Maydis leaf blight, CLS - Curvularia leaf spot, BLSB - Banded leaf and sheath blight

**Table 3:** District and taluk wise percent disease index of turcicum leaf blight of maize during *Kharif*-2019

District	Taluk	Percent disease index
Shivamogga	Shivamogga	43.54
	Shikaripura	44.64
	Soraba	18.55
	Mean	35.58
Davanagere	Davanagere	26.30
	Honnali	61.28
	Channagiri	41.88
	Mean	43.15
Grand mean		39.36



**Fig 1:** Taluk wise percent disease index of turcicum leaf blight of maize during *Kharif*-2019

#### 4. Discussion

The survey data revealed that, among the two districts surveyed, the highest percent disease index was recorded in Davanagere district than Shivamogga district with a mean PDI of 43.15 and 35.58, respectively.

This variation with respect to the occurrence and severity of turcicum leaf blight of maize is attributed to varying climate conditions at different locations surveyed. The presence of

maximum percent disease index in Honnali taluk was due to favourable environmental conditions which supports optimum growth of the pathogen during the cropping season, *viz.*, higher temperature (25-30 °C), soil moisture and relative humidity (>80 %) which had triggered the pathogen spore in plant debris to germinate and cause infection (Rajeshwar *et al.*, 2013) [9]. Frequent showers has resulted in dispersal of spore from an infected plant to the healthier one; monocropping, narrow genetic makeup of the commercial hybrids grown and non-adoption of effective management practices could be a reason for higher disease index in these areas. However, presence of unfavourable climatic condition, crop rotation and kind of cultivar grown could be a reason for lower disease index in Soraba taluk.

The present findings are in agreement with Harlapur (2005) [3] and Khedekar *et al.* (2010) [5], who stated that prevailing environmental conditions during cropping season could be a reason for the higher incidence of disease in different areas surveyed. Manu *et al.* (2018) [17] reported highest percent disease index in Chikkamagalur district, with a mean PDI of 55.07. The least percent disease index was recorded in Mysore (42.4), followed by Kodagu district with a PDI of 44.5. Previous survey reports had indicated that, cultivar susceptibility and weather parameters play a major role in the development of higher severity of the disease which was supportive to our results obtained.

#### 5. Conclusion

Turcicum Leaf Blight is one of the important disease causing huge losses in maize. Knowing the prevalence and hotspot would help in designing a specific management practices. From the survey we observed lot of variation in the prevalence and is attributed to varied level of pathogen population, practice of monocropping and pathogen adaptability to varied climatic conditions across the two districts.

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