International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(5): 2484-2486

Received: 06-07-2018
Accepted: 08-08-2018

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Survey for the severity of turcicum leaf blight of maize in major maize growing regions of North Eastern Karnataka

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Abstract
Northern corn leaf blight or turcicum leaf blight caused by *Exserohilum turcicum* (Pass.) Leonard and Suggs is one of the important diseases affecting photosynthesis and yield. The survey results revealed that Northern corn leaf blight (NCLB) or turcicum leaf blight (TLB) was widely distributed in almost all surveyed areas. Survey indicated that, the disease was noticed in all the maize growing areas of the North Eastern Karnataka in a low to severe form. The results revealed that, the highest disease severity was noticed in fields of Choornoor (40.00%), Kottur (38.00%) and Sovenahalli (34.00%) Villages of Ballari district. Least TLB severity was observed in Banapur (2.00%) of Ballari district. TLB was more prevalent in Ballari district due to the continuous cultivation of maize and also receiving good rainfall during August and September months.

Keywords: Maize, survey, disease severity, turcicum leaf blight

Introduction
Maize (*Zea mays* L.) is an important coarse cereal and is the third major crop in India after rice and wheat. It is cultivated in tropics, subtropics and temperate regions under irrigated and rainfed conditions. Large proportion of maize is used as poultry and cattle feed. Major maize growing states like Karnataka, Andhra Pradesh, Maharashtra, Uttar Pradesh, Bihar, Rajasthan, Madhya Pradesh and Punjab together contribute 60 percent of area and 70 percent of maize production in India. Nearly 90 percent of the total production of maize comes from *kharif* season covering an area to the extent of 86 percent. The irrigated ecosystem accounts for 60 percent area and more than 90 percent area is covered by hybrids. The major maize growing districts of the state are Davanagere, Haveri, Belgaum, Bagalkot, Shimoga, Bengaluru Rural, Ballari, Vijayapura, Chamarajnagar, Chitradurga, Kalaburagi, Koppal, Dharwad, Gadag, Kolar, Chikkaballapura and Mysore. Area under maize is increasing rapidly in the state because of congenial environment and availability of high yielding hybrids.

Among the foliar diseases of maize, the turcicum leaf blight (TLB) also called as Northern corn leaf blight caused by *Exserohilum turcicum* (Pass) Leonard and Suggs. (syn. *Helminthosporium turcicum* Pass.) is having worldwide importance. The disease was first described by Passerini (1876) [10] from Italy and by Butler (1907) from India. Turcicum leaf blight is one of the most important foliar fungal disease affecting photosynthesis with severe reduction in grain yield of more than 50 percent (Raymundo and Hooker, 1981 and Perkins and Pederson, 1987) [13, 12]. Pant *et al.* (2001) [4] who reported about 91 percent reduction in the rate of photosynthesis when severity of TLB in maize exceeded 50 percent. In North Eastern Karnataka, maize cultivation is becoming popular in recent years and much information is available with respect of turcicum leaf blight. But, still survey of the disease in the area will give a definite idea about the disease status and distribution. It is necessary to conduct survey of the disease to get comprehensive information on disease distribution, level of severity, extent of spread and to locate hot spots for testing of genotypes in disease resistance programme.

Material and Methods
A roving survey for the severity of turcicum leaf blight of maize was conducted in different districts of North Eastern Karnataka.

The survey was conducted during *kharif* 2016 in major maize growing areas of Raichur, Koppal, Ballari, Yadgiri and Kalaburgi districts of Karnataka. In each district, two to three important maize growing taluks were selected, in each taluk five villages depends on the availability of the crop, in each village three maize fields were selected, in each plot randomly selected five spots and ten plants were observed for symptoms when the crop was at silking to grain maturity stage. The severity of leaf blight was recorded using 0-5 disease rating scale (Mayee and Datar, 1986) [8]. Further these values were converted into Percent Disease Index (PDI) as per the formula given below (Wheeler, 1969) [15].

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

Results and Discussion

A roving survey was conducted in five districts of North Eastern Karnataka during *kharif* 2016 in major maize growing areas of Koppal, Ballari, Raichur, Yadgir and Kalaburagi districts as mentioned in material and methods. The results revealed that, turcicum leaf blight disease was prevalent in all the maize growing areas of Raichur, Koppal, Ballari, Yadgir and Kalaburagi districts in low to severe form with ranging from 2.00 to 40.00 percent. Among 32 locations surveyed, maximum Percent Disease Index (PDI) of TLB was observed in Choornoor (40.00) followed by, Kottur (38.00), Sovenahalli (34.00), Gudekote (32.00) villages of Ballari district. and Byadihal (28.00) village of Koppal district. Least PDI was noticed in Banapur (2.00) of Ballari district. The severity of these diseases recorded during silking to cob maturity stage (Table. 1).

The maximum severity of TLB in Choornoor, Kottur and Sovenahalli could be due to the continuous cultivation of maize since five years during *kharif* seasons and received good rainfall during the August and September months and availability of previous season primary source of inoculum coinciding with high relative humidity coupled with moderate temperature. In Raichur and Kalaburagi the severity was quite low because, maize crop is grown in isolated pockets since two to three years. There was intermittent and continuous dry spell during the cropping season, except in the 2nd fortnight of September 2016 received good rainfall which may not have been inadequate to develop the disease in Raichur and Kalaburagi districts.

The mean percent disease index of TLB was 19.57, 15.63, 14.00, 12.00 and 5.00 recorded in Ballari, Koppal, Yadgir, Kalaburagi and Raichur districts respectively.

The findings of the present study are in agreement with earlier workers (Harlapur, 2005 and Khedekar *et al.* 2010) [5, 7] who stated that prevailing environmental conditions during cropping season could be a reason for higher incidence of disease in these areas. Ullstrup (1966) [14] reported that TLB incidence vary in prevalence and severity from year to year and from one locality to another, depending largely on environmental conditions. Humid weather along with heavy dew favoured the spread and development of the disease in an epidemic form. Earlier survey reports (Harlapur *et al*., 2000) [6] indicated that, cultivar susceptibility, weather parameters play an important role for the high severity of the disease. Similar observations were also made by several workers (Gowda *et al*., 1989; Dharanendraswamy (2003) [4, 3] and Babu *et al*., 2004) [2]. Studies on turcicum leaf blight of maize in Uganda by Adipala *et al*., (1995) [1] found that the disease occurred in all areas sampled and was more severe in wet areas with relative humidity of more than 80 percent in comparison to dry areas.

Table 1: Severity of turcicum leaf blight in maize growing areas of North Eastern Karnataka during *kharif* 2016

Sl. No.	District	Taluk	Location	Crop stage	Disease severity (PDI)
1	Kalaburgi	Jewargi	Raddewadgi	Cob maturity	18.00
			Farathabad	Silking	12.00
			Udanur	Seedling stage	6.00
	Mean				12.00
2	Ballari	Ballari	Hagari	Seedling stage	12.00
			Hanakanahalli	Cob maturity	24.00
			Sidargadda	Silking	4.00
			Banapur	Seedling stage	2.00
			Bevinahalli	Post silking	10.00
		Sandur	Choornoor	Cob maturity	40.00
			Sovenahalli	Cob maturity	34.00
		Kudligi	Gudekote	Silking	32.00
			Aedigudda	Cob maturity	26.00
			Kottur	Silking	38.00
		Hagaribomma Nahalli	Dibbadahalli	Cob maturity	12.00
		Hadagali	Nagati basavapur	Silking	14.00
			Hadagali	Grand growth	20.00
		Siruguppa	Dasapur	Silking	6.00
	Mean				19.57
3	Koppal	Koppal	Hiresindagi	Cob maturity	8.00
			Hulihyder	Cob maturity	10.00
			Wadaganahal	Silking	20.00
		Kushtagi	Byadihal	Post silking	28.00
			Kushtagi	Silking	16.00
		Yalburga	Rajooru	Cob maturity	24.00
			Mataladinni	Cob maturity	8.00
			Bandi	Silking	14.00
			Nittali	Cob maturity	18.00
			Tuppargaddi	Post silking	10.00

		Gangavathi	Kanakagiri	Cob maturity	16.00
	Mean				15.63
4	Yadgir	Yadgiri	Bheemarayanagudi	Cob maturity	12.00
		Shahapur	Googi	Post silking	16.00
	Mean				14.00
5	Raichur	Raichur	Raichur	Silking	6.00
		Manvi	Manvi	Cob maturity	4.00
	Mean				5.00

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