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Host Range Studies of Maize Turcicum Leaf Blight Pathogen- *Exserohilum turcicum*

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ABSTRACT

Maize leaf blight pathogen, *Exserohilum turcicum* has a wide host range infecting both crops and weeds. In order to find out its host range crop plants including rice, sorghum, korra, ragi, bajra, proso millet, barnyard millet, little millet, browntop millet, maize and two weed species commonly found in maize growing ecosystems (*Cyperus rotundus, Commelina benghalensis*) were inoculated with the fungus under greenhouse conditions at Agricultural College, Bapatla. Among all the crop species tested, the disease symptoms were observed on maize, sorghum, korra, ragi, bajra and browntop millet. The fungus also infected both the weed species. Incubation period varied from 24 to 36 hours. The highest incubation period (36hours) was observed in ragi, while the lowest incubation period (24 hours) was observed in maize. Lesion length varied from 1.35 in ragi to 11.12 cm in maize. Disease severity varied between 2.5 and 24.5%. The highest disease severity (24.5%) was observed in maize, and the lowest (3.5%) in ragi.

Keywords: *Exserohilum turcicum, Host range, Maize, Turcicum leaf blight and Weed hosts.*

Turcicum leaf blight of maize (*Zea mays*), also known as northern corn leaf blight caused by *Exserohilum turcicum*, is a widespread disease of maize, which can cause yield losses up to 70% (Yeshitila, 2003). Apart from yield loss, the disease causes qualitative changes in the seed resulting in decreased sugar content, germination capacity and severely infected plants are predisposed to stalk rot (Cardwell *et al.*, 1997). The pathogen was reported to have wide host range infecting crop species (Sirithunya *et al.*, 2015), like sorghum, barley, oat, rice, millets, Sudan grass, Johnson grass, tobacco and sugarcane (Frederiksen and Franklin, 1980 and Shurleff 2012), while weed species like *Cyperus rotundus, C. difformis, Cynodon dactylon, Commelina obliqua* and *Amaranthus viridis* were identified as collateral hosts. The pathogen was reported to perpetuate in these hosts in the absence of maize (Acharya and Sengupta, 2008). The present investigation was carried out for the identification of other hosts of *E. turcicum* causing maize turcicum leaf blight.

MATERIAL AND METHODS

Crop seed material was obtained from ARS, Vizianagaram and weed seedlings were collected from the maize growing ecosystem of Bapatla. Seeds and seedlings were raised in the pots containing sterilized soil and three plants per pot were maintained and was replicated thrice.

Inoculum preparation

Pure culture of *E. turcicum* maintained on PDA was used for experimentation. Conidia from 12 days old culture were dislodged by flooding the plate with distilled water followed by gentle scraping. The spore suspension was harvested in to a beaker and strained through muslin cloth. Tween-20 @ 0.1% was

added to spore suspension before inoculation to ensure uniform spread of inoculum over leaves. The spore suspension was adjusted to 10^5 spores per ml using haemocytometer and then inoculated using hand sprayer @15ml/ plant during evening hours. The plants sprayed with sterile distilled water andTween-20 (0.1%) served as control.

Immediately after spraying, the plants were covered with poly propylene covers for 24h inorder to prevent cross contamination and to maintain humidity for pathogen establishment (plate 1). Time required for first appearance of symptoms in each treatment was assessed by examining inoculated plants for appearance of lesion. Disease severity were recorded 20 days after inoculation by using standard scales *i.e*., 1-5 scale for maize (CIMMYT, 2004), 1-9 scale for sorghum (Thakur *et al*., 2007) and 1-9 scale for millets (Nagaraja *et al.,* 2017). Based on disease severity PDI was calculated (Wheeler, 1969).

RESULTS AND DISCUSSION

Among the twelve different crop species, eight crop plants *viz.*, maize. bajra, ragi, korra, sorghum, browntop millet, coco grass and benghal dayflower succumbed to the pathogen, While rice, proso millet, barnyard millet and little millet developed no symptoms.

The maize was recorded with the minimum incubation period (24 h) and was significantly superior compared to other treatments. The longest incubation period of (36 h) was recorded in ragi (Table 1 and Fig 1).

Maximum lesion length (11.12 cm) was observed in maize which recorded shortest incubation period and high PDI compared to other treatments while the least lesion length (1.35 cm) was recorded in ragi with longest incubation period (Table 1, Fig 1 and Plate 2).

The PDI recorded in different hosts varied significantly. Maximum PDI of 24.50% was recorded with the maize plant which differed significantly with other treatments. While the ragi plant recorded the lowest PDI of 2.50% and was statistically differed with other hosts (Table and Fig 1).

Minimum incubation period for the pathogen in the host gives an advantage to the pathogen for establishment (Agrios, 2005). Similar observations were reported by Shurleff (2012) where, corn, sorghum, barley, oat, rice, millet, Sudan grass, Johnson grass and tobacco seedlings acted as alternative hosts

Table 1. Reaction of different crop plants against *E. turcicum*

S. No.	Name of the host	Incubation period Mean (h)	Lesion length (cm) (20 DAI) Mean	PDI (Mean) (%)
1.	Maize	**24.00 (4.99)^{d}**	**11.12 (3.47)^{a}**	**24.50 (5.04)^{a}**
2.	Sorghum	28.00 (5.38)^{c}	9.50 (3.24)^{b}	12. 30 (3.64)^{b}
3.	Ragi	**36.00 (6.08)^{a}**	**1.35 (1.53)^{h}**	**2.50 (1.87)^{h}**
4.	Korra	29.00 (5.47)^{c}	3.85 (2.20)^{g}	5.38 (2.52)^{g}
5.	Bajra	28.00 (5.38)^{c}	5.84 (2.61)^{c}	11.80 (3.57)^{c}
6.	Browntop millet	32.00 (5.74)^{b}	4.40 (2.32)^{f}	7.26 (2.87)^{f}
7.	Coco grass	32.00 (5.74)^{b}	5.25 (2.49)^{e}	9.35 (3.21)^{e}
8.	Benghal dayflower	31.00 (5.65)^{b}	5.60 (2.56)^{d}	11.20 (3.49)^{d}
9.	Rice	0.00 (1.00)^{e}	0.00 (1.00)^{i}	0.00 (1.00)^{i}
10.	Proso millet	0.00 (1.00)^{e}	0.00 (1.00)^{i}	0.00 (1.00)^{i}
11.	Little millet	0.00 (1.00)^{e}	0.00 (1.00)^{i}	0.00 (1.00)^{i}
12.	Barnyard millet	0.00 (1.00)^{e}	0.00 (1.00)^{i}	0.00 (1.00)^{i}
SEm±		0.042	0.008	0.006
CD (P≤0.05)		0.124	0.024	0.018
CV (%)		1.826	0.719	0.429

Plate 1. Pots covered with polypropylene covers to prevent cross inoculation

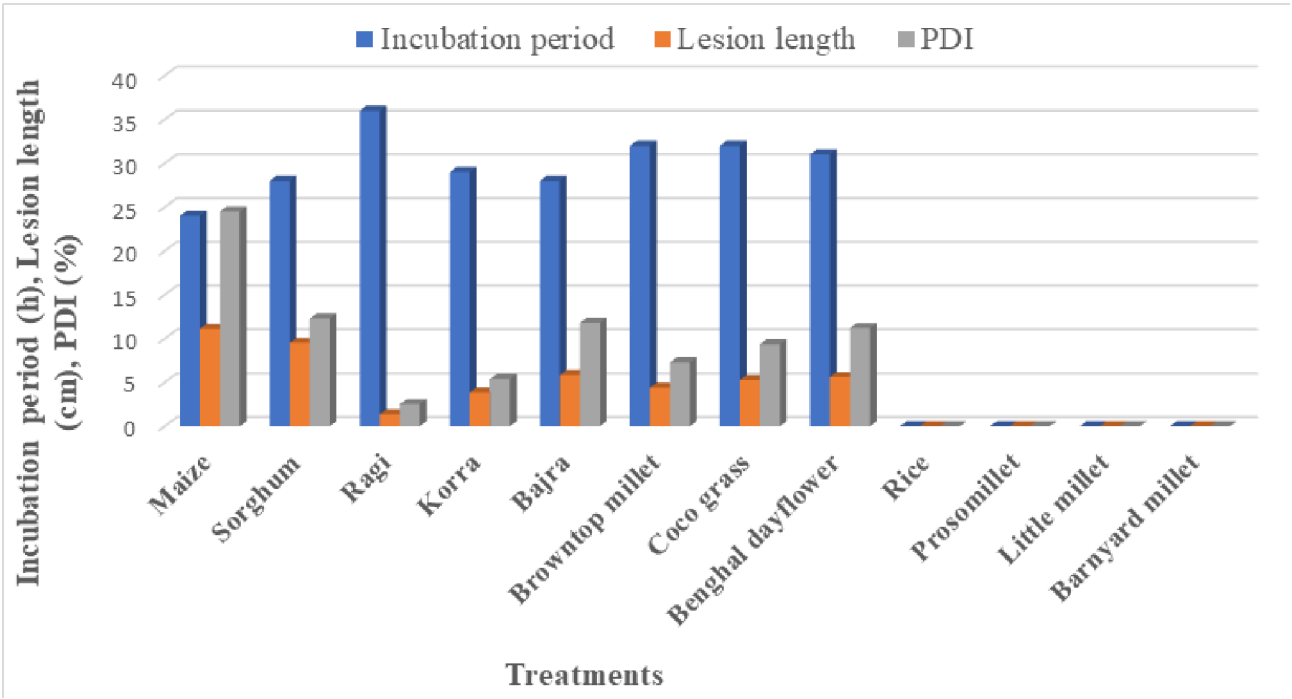

Fig 1. Reaction of different crop plants against *E. turcicum*

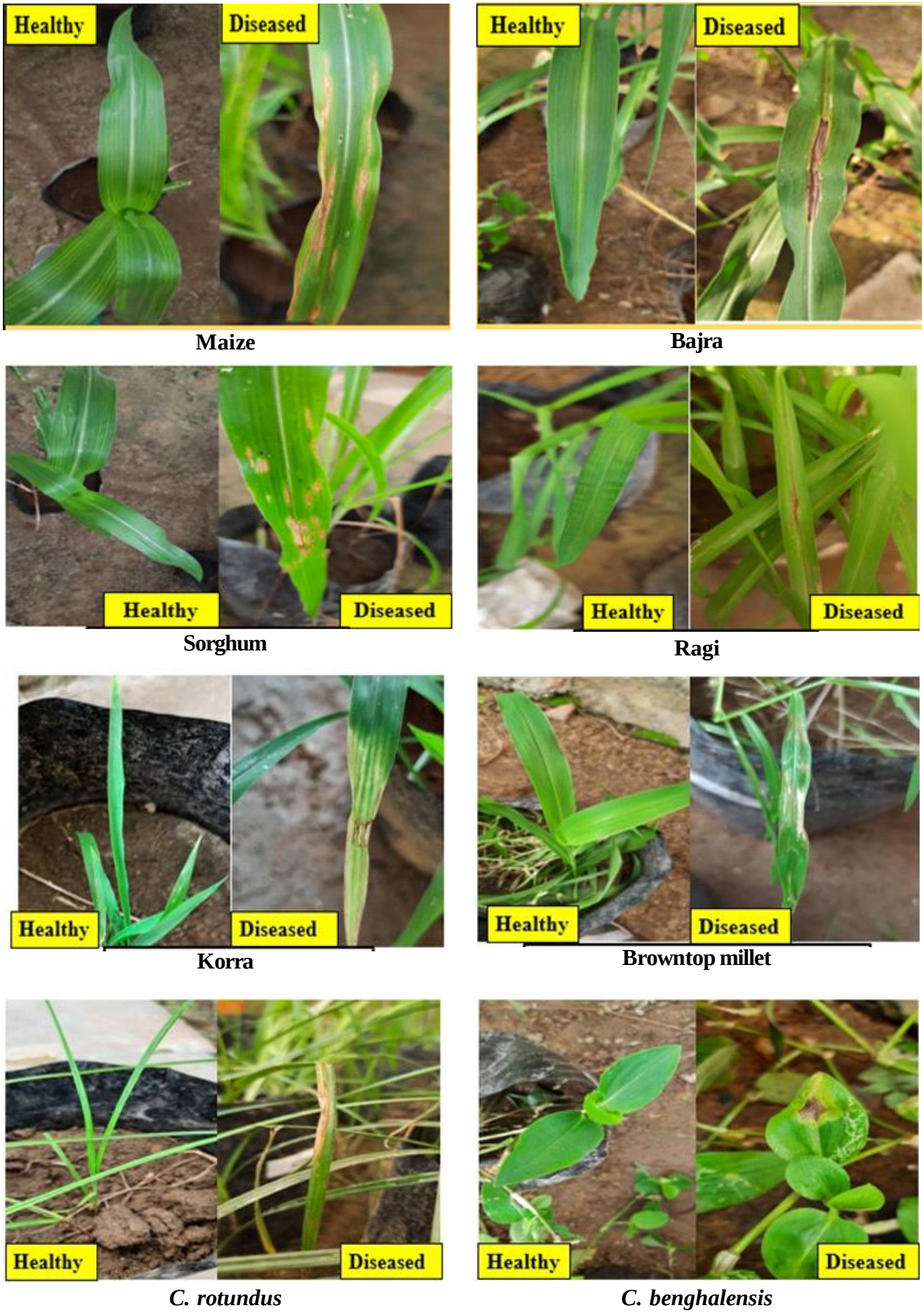

Plate 2. Disease symptoms on different crop species

for this pathogen. Frederiksen and Franklin (1980) reported that *E. turcicum* was often found on sorghum, barley, wheat, oat, sugarcane, rice and corn. Goswami *et al.* (2010) reported that wheat, rice, maize, prosomillet, foxtail millet, barley, sorghum were found to be infected by the fungus. Several weeds like *Cyperus rotundus, C. difformis*, *Cynodon dactylon*, *Commelina obliqua* and *Amaranthus viridis* were also identified as collateral hosts for the pathogen (Acharya and Sengupta, 2008).

CONCLUSION

Maize turcicum leaf blight pathogen, *E. turcicum* showed wide host range infecting both crop and weed species. Maximum PDI and lesion length was observed in maize which acted as primary host and other infected hosts confirmed to act as collateral hosts. So, it is better recommended that weeding at timely intervals during crop season and selection of non-host crops for crop rotation helps in minimizing the inoculum and thus reduce the disease in the next crop season.

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