Original Research Article

Screening of inbred lines of Maize against Turcicum Leaf Blight(*Exs~~c~~erohilumturcicum*)underartificialepiphytotic conditions

ABSTRACT:

Aims: Turcicum Leaf Blight (TLB) caused by *Exserohilum turcicum* is a major foliardisease of maize in Karnataka with yield losses up to 70% under severe cases. In thecontext of developing tolerant genotypes against this disease, an experiment wasconducted using 100 maize inbred lines which wa~~i~~s collected from IMIC maize field day, Hyderabad.

Study design: Investigation was carried using ~~Randomixed~~randomized complete block design with two replications.

Place and Duration of Study: Maize Research Centre and Seed Farm, Devihosur during *kharif*-2022, 2023.

Methodology:~~ These~~One hundred~~100~~ maize inbredlines were screened against TLB disease, and among them ten~~10~~ resistant lines were selectedbased on theirdisease reaction, grain yield and per se performance and were crossed~~these lines~~ in 10 X 10 half-diallel fashion to produce 45 experimental hybrids. The~~se~~hybrids,~~along with the~~and their parents were sown during~~in~~~~k~~*Kharif*- 2023 at Maize Research Centre andSeed Farm Devihosur, UAS, Dharwad to study the disease reaction against TLB.Artificialinoculation was done in the leaf whorls with grounded TLB infected leaves at 45 daysafter sowing and were scored at silk drying stage. Disease reaction was recorded by using 1 to 9 scale of Indian Institute of MaizeResearch, Ludhiana (Anon., 2016). The lines showing disease score between 1.0–3.0will be considered as resistant (R), 4-5 as moderately resistant (MR), 6-7 as moderatelysusceptible (MS), 8-9 as susceptible (S).

Results:~~The lines showing disease score between 1.0–3.0will be considered as resistant (R), 4-5 as moderately resistant (MR), 6-7 as moderatelysusceptible (MS), 8-9 as susceptible (S).~~ The performance of the tenseparents ~~lines~~ and hybridswere compared with the TLB resistant check CI-4 and susceptible check CM-202. ~~Artificialinoculation was done in the leaf whorls with grounded TLB infected leaves at 45 daysafter sowing and were scored at silk drying stage.~~ Screening trial revealedthat, ~~out that~~ 18lines s~~S~~howed highly resistant reaction. This information can be useful for selection ofparents and to develop tolerant hybrids in breeding programs or utilize them as sourceofresistance.

Formatted: Font: Italic

Formatted: Font: Italic

Keywords: *TLB, ~~Single Cross~~ Hybrids, Artificial inoculation, Resistance, Tolerance*

1.Introduction:

Maize (*Zea mays L.*) is an important crop globally due to its high yield potential, ~~and~~servinges as food, feed and it provides raw materials for agro-allied industries ~~in the world~~.In India, it is the third important cereal after wheat and rice in terms of area andproduction. The global average productivity of maize is 5.8 t/ha and India's productivityis3.38 t/ha.In Karnataka,maizeoccupiesan areaof1.59mha,withtheproductionof 5.22 mt and average productivity is 3.27 t/ha (~~Annual Progress Report, *Kharif* maize,2023, AICRP on maize~~ add as citation). Despite its high yield potential, one of the major limitingfactors to maize grain yield is its sensitivity to several diseases. Approximately 65pathogens infect maize (Reference?). Turcicum Leaf Blight (TLB) caused by *Exserohilum turcicum*isoneofthemajorfoliardiseasesinmaizecausingmorethan50%yieldlossinseverecases in Karnataka. Due to moderate low temperature and high humidity during themaizegrowingperiod,TLB hasbecomeamajordisease.

Formatted: Strikethrough

TLB occurs sporadically in humid areas where maize is grown. TLB causes leafnecrosisandprematuredeathoffoliagewhichreducesthefodderandgrainvalueof the crop~~thecrop~~. In India the disease~~s~~was~~are~~ prevalent in the states of Karnataka, Himachal Pradesh,Uttar Pradesh, Uttarakhand, Orissa, Andhra Pradesh and North Eastern Hill states. Italso affects the r~~R~~*abi* maize in the plains of India (Reference?). TLB is endemic in all maize growingareas and considered as a limiting biotic factor for successful cultivation of maize,which results in significant yield losses in the range of 28 to 91 per cent (Pant *et al*.,2000 any recent reference?). TLB caused by *Exserohilum turcicum* (Pass.) Leonard and Suggs, is known toinfect maize from the seedling stage to maturity. the symptoms first start as smallelliptical spots on the leaves as grayish green with water-soaked lesions parallel to leafmargins, the spots turn grayish with age and increase in size, finally attaining a spindleshape with long elliptical grayish or tan lesions. If the disease starts at an early stage, itcauses premature death of the blighted leaves. As a result, the crop loses their nutritivevalueasfodder(PayakandRenfro.1968),havereducedgerminationcapacity,vigor,

Formatted: Font: Italic

Formatted: Highlight

Formatted: Highlight

g~~G~~rain yield and total sugar content (Ferguson and Carson, 2004)have restricted s~~S~~tarchformation, chaffy kernels and infected plants are liable to infection with stalk rots(Henry and Kettelewell. 1996). The fungus has a wide host range and a high pathogenicvariability with several races already reported in different parts of the world.~~(~~Thegenetics of resistance wa~~i~~s determined ~~in most of maze genotypes~~ quantitatively in most of maize genotypes ~~and hasbeen used~~ for the control of ~~this~~ disease. Resistance was reported to be partially dominantand controlled by many genes (Vanderplank, 1963).Although the losses due to thesediseases can be minimized by foliar application of fungicides, the most appropriate andeconomical strategy is to use host plant resistance and resistance breeding programs.In this context an experiment was designed to identify new hybrids and sources ofresistanceagainst TurcicumLeafBlight forfutureusein maizebreedingprogram.~~.~~

2.MaterialsandMethods

In the context of screening tolerant genotypes against this disease an experiment wasconducted using 100 inbred lines (Table 1?). Among them 10 lines were selected based on theirdisease reaction, test weight and per se performance. These lines were crossed in 10 X10halfdi~~-~~allelfashionsto produce45singlecrosshybrids.Thesehybridsalongwiththe parents were sown in *k~~K~~harif*~~-~~ 2023 at Maize Research Centre and Seed FarmDevihosur, UAS, Dharwad (Northern transition zone (Zone VIII) of Karnataka) to studythe disease reaction against TLB. This location has been identified as one of the hotspots for TLB incidence (Harlapur *et al.,* 2007). The performance of these lines andhybridswerecomparedwiththeresistantcheck CI-4andsusceptiblecheckCM-202.Along with these three checks; GH-0727, 900 M Gold and NK-6240 were alsoevaluated as acomparison with thedeveloped hybrids (For grain yield?). Mention about your design, replication, spacing, managemement practices and others?~~.~~

Formatted: Highlight

Formatted: Highlight

Formatted: Font: Italic

Formatted: Left, Indent: Left: 0"

2.1 Inoculationofpathogenonhost :

Artificial inoculation was done by collecting heavily infected leaves collected from theprevious season. These infected leaves were stored in large gunny bags in dryconditions protected from moisture and rodents. Pure culture of fungus was prepared byusingHyphatipisolationprocedureandmultiplicationisdoneusingSorghumgrain.

Inoculation was done at 45 days afterof sowing (when plant attains the height of 30-45 cm)by placing a pinch of leaf meal into whorl of each plant. In order to counteract theprevailing dry weather, water was applied in the whorls by means of sprayer (highhumid weatheris congenial fortheestablishment and diseasespread).

2.2 Evaluationandrecordingofdiseasereaction

The scale consists of five broad categories designated by numerals from 1 to 9 (IndianInstitute of Maize Research, Ludhiana reference?). Scoring was done at silk drying stage of theplant.The classificationhasbeengiveninTable.2.

Table1.List ofMaizeinbred linesusedforScreening againstTurcicumleafblight during Kharif-2022

SL. NO	INBRED LINE	PEDIGREE/SOURCEPOPULATION	SL. NO	INBRED LINE	PEDIGREE/SOURCEPOPULATION
1	VL19978	HYDTSyn16HG(A)-8-2-1-B-B1-BB	26	VL185877	((CAL1821/CML165-B*9)-B)DH126-BB
2	VL191001	HYDTSyn16HG(B)-10-1-1-B-B1-8	27	VL184659	CML581/CML161X165-16-2-1-B*8)HB)DH12-BB
3	VL20300	SUWANI(5)C9-#-9-1-B1-B	28	VL184725	((CML581/CML161X165-16-2-1-B*8)DH78-BB
4	VL18775	CL02450-B5/G9BCORL23-1P-2P-3-2P-3G9BCORL34-2P-IP-1-1-1)7-1-3-3-2-1-B*8)B-2-BB-B1-B	29	VL184560	((CML581/CML165-B*9)-B)DH44-BB
5	VL18246	(ICMLAS1/OFP67//CML451)-12 B*5/Composite4)-B-B2-1-B(DM)-BBB-B2-B	30	VL184578	((CML581/CML165-B*9)-B)DH62-BB
6	VL20157	(Composite15-BBB-1-B-1-B-BICTS013008/AMATLCOHS71-1-1-2-1-1-1-HY:B5/Nei402020)-B 12)-B-24-B-BI-B	31	VL184076	(CML581/CML161X165-16-2-1B*8/CML581)DH106-BB
7	VL20160	Composite15-BBB-1-B-1-B-#BCA14517/P145CAMH7-1-B-1-1-B-1-1B-17-1-B-22-B-B1-BB	32	VL183975	CML581/CML161X165-16-2-1B*8//CML581)DH5-BB
8	VL143905	CML444/VL111354)-38-B-4-BB-4-85	33	VL184330	CML582/CML165-B*9//CML582)DH5-BB
9	VL107657	85(CML474/S92145-2EV-7-3-B5)-F2-58-19V1825-6	34	VL1010960	PHG47-BBB-#-B
10	VL1016532	CML161X165-16-2-1-B13	35	KL141702	PHR63-BBB-#-B
11	VL21943	CL106712/LH195)-B/CLHP0003)-B-6-1-11-BBB	36	KL20264	P73TLC3#-111-2-4-##-BB)x(RCW01)]-1150-B4/(CML474/S92145-2EV-7-3-B*5)-F225-1-B 11//[(P73TLC3#-111-2-4-##BB)x(RCW01)]-1-150-B5)-B-5(0)-B(DM)B1-BBB
12	VL181619	(CL106728/LH213)-B/CML575)-B-6-3-1-1-1BBB	37	VL20269	HYDTSyn16HG(A)-1-1-2(DM)-B1-BBB
13	VL21952	(CML31/2FADB//CML486))DH0-46-B8	38	VL18720	((CML465/CML165-B//CML465)-BB-36 B*5/((CML161xCML451)-B-18-1BBB/CML161-B)-B-13-BB(NonQ)-BBB-B1)B-3-B-B1-B
14	VL181565	((CMLS22/PHN82)-B/CML551)-B-6-3-1-1-1BBB	39	VL18722	(CML465/CML165-B//CML465)-BB-36B*5/((CML161xCML451)-B-18-1BBB/CML161-B)-B-13-BB(NonQ)-BBB-B1)B-6-B-BI-B
15	VL181675	((CMLS22/PHN82)-B/CML551)-B-6-8-1-1-1BBB	40	VL18718	CML466/CML165-B//CML466)-BB-9B*4/(CML465/CML165-B//CML465)-BB-36B*5)-B-10-B-BI-B
16	VL21968	((CML539/2FADB//CML486))DH0-7-B*7	41	VL18686	(CML466/CML165-B//CML466)-BB-9B*4/(CML465/CML165-B//CML465)-BB-36-HY2B*S)-B-3-BBB
17	VL21969	((CML545/PHHB9)-B/CML496)-B-81-2-1-1BBB	42	VL18716	((CML466/CML165-B//CML466)-BB-9B*4/(CML465/CML165-B//CML465)-BB-36-HYZB*5)-B-8-B-B1-B
18	VL181580	((CML78/PHG39)-B/CML486)-B-6-3-1-1-1BBB	43	VL18726	[(P73TLC3#-111-2-4-##-BB)x(RCW01)]-1150-B*4/(CML474/S92145-2EV-7-3-B*5)-F2-HY 58-1-B*12)-B-2-B-B1-B1
19	VL21976	CL106941/PHR03//CML451)-7-2-1-1-1-B*4	44	VL18727	[(P73TLC3#-111-2-4-##-BB)x(RCW01)]-1150-B*4/(CML474/S92145-2EV-7-3-B*5)-F258-1-B*12)-B-3-B-B1-B
20	VL21978	CML311/2FADB//CML486)-89-1-1-1-1-1B*5	45	VL18729	[CML327xCML287]F2-32-1-B*5-1B*10/[(P73TLC3#-111-2-4-##BB)x(RCW01)]-1-150-B*4)-B-3-B-B1-B
21	VL21980	CML519/LH213//CML323)-9-3-1-1-1-B*4	46	VL18911	(CL02450 B*5/(CLRCY015/[CML373xCML361]-BB-2-EBBB)-B*4-1)-B-4-B-B1-B
22	VL21988	SUWANDMR-C3-35-1-1-1-1-1-B*4	47	VL18901	CL02450 B*5/(CLRCY015/[CML373xCML361]-BB-2BBB)-B*4-1)-B-5-1-BB
23	VL21989	SUWANDMR-C3-43-1-1-1-0-1-B*4	48	VL18914	CL02450 B*5/(CLRCY015/[CML373xCML361]-BB-2BBB)-B*4-1)-B-5-3-B1-B

24	VL21990	SUWANDMR-C3-54-1-1-1-1-1-B*4	49	VL18896	(CML451-B*7/((CLA37/CLA42)-BBB40/CLA18)-B*4-1)-B-2-BBB
25	VL185586	(((CLQ-RCYQ31xCLQ-RCYQ35)-B-36-2*4/CML581)-B)DH31-BB	50	VL18909	CML581/CML161X165-16-2-1B*8//CML581)DH5-BB

SL. NO	INBRED LINE	PEDIGREE/SOURCEPOPULATION	SL. NO	INBRED LINE	PEDIGREE/SOURCEPOPULATION
51	VL18910	(CML451-B*7/PobSA3-106-BBB-5)-B-4-BB1-B	76	VL2088	GS13C2F2-40-BB-B1-BB
52	VL22280	CA34505xCA00302)-B-2-1-B-1-BB(T)-BS<#17-3-B-2-B*5/(LaPostaSeqC7-F64-2-7-2-1B*4/LaPostaSeqC7-F55-2-2-2-1-B*5)-18BBB-#-B//(CA34505xCA00302)-B-2-1-B-1 BB(T)-B5-#17-3-B-2-B*5/PHG39-BB)-B-1BB	77	VL109452	(CLQ-6601xCL-02843)-B-26-3-1-BB-2-B*81-B4
53	VL22282	(CA34505xCA00302)-B-2-1-B-1-BB(T)-B5#17-3-B-2-B*5/(LaPostaSeqC7-F64-2-7-2-1B*4/LaPostaSeqC7-F55-2-2-2-1-B*5)-18BBB-#-B//(CA34505xCA00302)-B-2-1-B-1 BB(T)-B5-#17-3-B-2-B*5/PHG39-BB)-B-12B1-B	78	VL143915	(VL111354/CML472)-7-B-1-B*4-#-B2-B
54	VL22292	CML165/OFP9//CML165)-7-B*5-3BBB/Composite18-B(Fat)-BB-3-BBB)-B-1BB	79	ZL19359	MPS-1-C2GS)DH16-BBB-B1
55	VL22297	(CML563/POB45c9F22-18-3-1-B*4-1-B*8-#B)-B-7-BB	80	ZL19467	(MPS-2-C1)DH17-B*4
56	VL22301	(CML563-B/(CML466/CML165-B//CML466)BB-11-B*6-B1)-B-8-BB	81	ZL19634	MPS-2-C3GS)DH73-B*4
57	VL22303	CML466/CML165-B//CML466)DUALCAMERAS-B1)-B-12-BB	82	ZL153633	EYSyn-A-#-27-#-B-2-BB-BI-#-1-B
58	VL22306	(CML451-B*7/PobSA3-106-BBB-5)-B-4-BB1-B	83	ZL155281	((Pop61C1QPMTEYF-40-1-1-1-2-B1/(CML161xCML451)-B-23-1-B*4-1)-B-5BB/G18SeqC5F19-1-2-1-2-4-B*5)DH35-B-#I-B
59	VL22308	((CA34505xCA00302)-B-2-1-B-1-BB(T)-B5#17-3-B-2 B*4/CML582//(CA34505xCA00302)-B-2-1-B1-BB(T)-B5-#17-3-B-2-B*5)-B-6-BB	84	ZL155285	Pop61CIQPMTEYF-40-1-1-1-2-B1/(CML161XCML451)-B-23-1-B*4-1)-B-5BB/G18SeqC5F19-1-2-1-2-4-B*5)DH42-B-#B
60	VL22310	CA34505xCA00302)-B-2-1-B-1-BB(T)-B5 #17-3-BB*4/CMLS82//(CA34505xCA00302)-B-2-1-B1-BB(T)-B5-#17-3-B-2-B*5)-B-11-BB	85	ZL17518	(HSBC1F1-3)DH75-B-#-BB
61	VL22319	(((CML161xCML451)-B-18-1-BBB/CML161B)-B-13-BB(NonQ)-BBB-B1 CML465/CML165-B//CML465)-B-15B1-B5)-B-9-BB	86	ZL17578	HSBCIF1-4)DH2-B-#-BB
62	VL22324	(CA03147-B*8-1/CA00360F2-3-5-6-1-B*11#-B)-B-6-BB	87	CAL1733	WLCY2-7-1-2-1-5-B-2-3-1-2-2-B*8-#-B2-B
63	VL22326	(CL02450-B*6-#/CML452=Ac8328BNC6166-1-1-1-B*15-#)-B-2-BB	88	CAL14137	WLCY2-7-1-2-1-5-B-2-2-2-2-1-B*9-#-B2-BH
64	VL22336	CML563/(POP501C5#8/GEMS-0039)-B-101-1-1-BB)-B-15-BB	89	ZL18910	G18SeqC5F19-1-2-1-2-4BB/CL02450)DH18-B*4
65	VL22337	CML563/(POP501C5#8/GEMS-0039)-B-101-1-1-BB)-B-27-BB	90	ZL19872	MPS-5-C1)DH62-B*4
66	VL22344	Composite15-BBB-1-B-1-B-# B/(CTS013004/AMATLCOHS71-1-1-2-1-1-1-HYB*5/Ki45)-B*6)-B-16-BB	91	ZL19611	MPS-2-C3GS)DH47-BBB
67	VL22345	(Composite15-BBB-1-B-1-B-#B/(CTS013008/AMATLCOHS71-1-1-2-1-1-1-HY B*5/Nei402020)-B*12)-B-15-BB	92	VL181418	CML566-B
68	VL22346	(Composite15-BBB-1-B-1-B-#B/(CTS013008/AMATLCOHS71-1-1-2-1-1-1-HY B*5/Nei402020)-B*12)-B-4-BB	93	VL21943	CML608B-B
69	VL22347	(Composite15-BBB-1-B-1-B-#/CA14517/P145C4MH7-1-B-1-1-B-1-1B*17-1)-B-7-BB	94	VL1013612	(CLG2309x([(P390bcoC3F191-1-1-1-4 B*4)x(P73TLC3#-96-3-4-#)]-2-2-3))-1-29-1-F153[((P390bcoC3F191-1-1-1-4-B*4)x(P73TLC3#115-1-4-#))-1-2-8)xRCW01]-1-167-BB-1BBB
70	VL22350	(CML444/VL111354)-42-B-#-B14-B	95	VL108153	(CAL1533/CML571)-BB-2-B2-BBB
71	VL22351	(CML444/VL111354)-42-B-#-B15-B	96	VL2084	CAL191/(Composite15)-B-11-BBB)-BB-17B2-BBB
72	VL18580	(CML451-B*4//CML451BBB/LaPostaSeqC7-F18-3-2-2-3B*7///CML451-B*4//CML451-BBB/DRB-F260-1-1-1-BBB-3-B)-BB/(ATZTRLBA905-3-3P-1P-4P-2P-1-1-1-B/G9BC0RL23-1P-2P-32P-3-2P-1P-BBB)-B-57TL-2-1-1-B*5)-B-3	97	VL2061	GS14C2F2-19-BB-B1-BBB
73	VL18670	((CA34505xCA00302)-B-2-1-B-1B(T)/ZEWBC1F2-216-2-2-B-2-B*4-1-B-1 BBB)-B-BI-B-5-BB1-B1-B	98	VL2090	(Composite15)-B-11-B-#-B11-B
74	VL162291	AMDROUT2c3-B-4-B(DM)-BB-B1-2-B-B1	99	VL191090	(Composite15)-B-11-B-#-B12-B

75	VL2049	((Composite15)-B-11BBB/(CML466/CML165-B//CML466)-BB-11HY21R-YB*4,-BB-8-B1-B	100	VL191093	(Composite15)-B-11-B-#-B14-B

Table2:DiseasescaleforTurcicumleafblight(TLB)inmaize

RatingScale	Degreeof infection(percentDLA)	Diseasereaction
1.0	Nilto veryslightinfection (<10%)	Resistant (R)(Score:≤3.0) (PDI:≤33.33)
2.0	Slightinfection,afewlesionsscatteredontwolowerleaves(10.1-20%).	
3.0	Lightinfection,moderatenumberoflesionsscatteredonfo urlower leaves(20.1-30%).	
4.0	Lightinfection,moderatenumberoflesionsscatteredonlo werleaves,afewlesions scatteredon middle leavesbelowthe cob(30.1-40%).	Moderatelyresistant (MR) (Score:3.1–5.0) (PDI:33.34-55.55)
5.0	Moderate infection, abundantnumber of lesions scatteredonlowerleaves,moderatenumberoflesions scatteredon middleleaves belowthecob (40.1-50%).	
6.0	Heavyinfection,abundantnumberoflesionsscatteredonl owerleaves,moderateinfectiononmiddleleaves andafewlesionsontwoleavesabovethecob(50.1-60%).	Moderately susceptible(MS) (Score:5.1-7.0) (PDI:55.56-77.77)
7.0	Heavyinfection,abundantnumberoflesionsscattered onlowerandmiddleleavesandmoderatenumberof lesionsontwotofourleavesabovethecob(60.1-70%).	
8.0	Very heavy infection,lesionsabundantscatteredonlower and middle leaves and spreading up to the flagleaf(70.1-80%).	Susceptible (S)(Score:>7.0) (PDI:>77.77)
9.0	Very heavy infection,lesionsabundantscatteredonalmostalltheleav es,plantprematurelydriedandkilled(>80%).	

3.1 Resultanddiscussion

Continuous efforts to locate the resistant source and utilization in resistant breedingprogramme are imperative to manage the disease in long run. Disease reaction indicatindicatingedsatisfactory level of disease development and thereby the classification into differentclasses will helpas appropriate selection. and easier. The screening trial has revealed that out of the 100lines swere Screened for TLB, 18 lines showed highly resistant reaction, 39 showedmoderately resistant reaction, 44 lines sShowed mModerately sSusceptible reaction and 7lines sShowedsSusceptible reaction.

Results are not sufficient:

Add atleast frequency distribution, and correlation with any yield related trait.

List 1 : LIST OF INBRED LINES

GROUP	SOURCE	INBREDLINES
Resistant	1-3	VL21943,VL20300,VL18167,VL21988,VL21989,VL18397,KL20264,VL18718,VL18727,VL18914,VL22297,VL22347,VL20840,VL20900,VL14390,VL10765,VL18587,VL18407
Moderatelyresistant	4-5	VL19978, VL21952, VL21969, VL18896, VL19103, VL18911,VL22292, VL19100, VL21968, VL18558, VL18456, VL10109,VL18722, VL22282, VL22319, VL22337, VL10945, VL14391,ZL19634, ZL17518, VL18141, VL21943, VL21978, VL21980,VL21990,VL18465,VL18472,VL18729,VL18901,VL18909, VL18910, VL22301, VL22306, VL22345, VL22346, VL22350,VL16229,VL10136,VL19109
Moderatelysusceptible	6-7	VL18775, VL20157, VL18161, VL18158, VL21976, VL18457,VL18433, VL20269, VL22280, VL22310, VL22336, VL18580,VL18670,ZL19359 , CAL14137, ZL18190, VL21943,VL20610,VL18246,KL14170,VL18720,VL18686,VL18716, VL18726,VL22303,VL22308,VL22324VL22326,VL22351,ZL15528,CAL1733, ZL19872,ZL19611,VL22344
Susceptible	8-9	VL20160,VL18156,VL20490,VL20880,ZL15363,ZL17578,ZL19467,VL10815,ZL15528

Fig1: ResistantcheckCI-4(left),SusceptiblecheckCM-202(right)

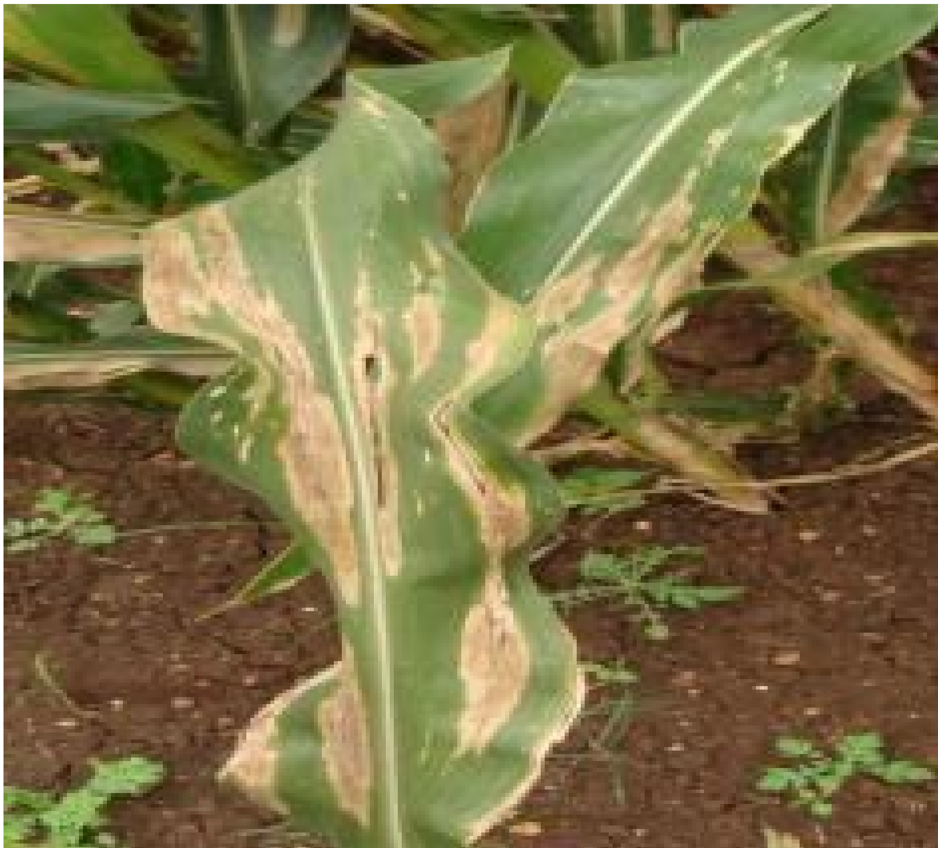

Fig2: Foliarsymptoms Turcicumleafblight

4. CONCLUSION :

Continuous efforts to locate the resistant source and utilization in resistant breedingprogramme are imperative to manage the disease in long run. Disease reaction indicatedsatisfactory level of disease development.Screening of inbred lines and identifying best resistant lines plays a major role in hybrid breeding. This information is very useful in development of resistance and development of resistant hybrids. (Rewrite, mention your important lines and suggest future aspects)

Formatted: Highlight

REFERENCES :

1. Anon.Annu.Prog.Rep.Maize,IIMR,Ludhiana,2016.
2. LeonardKJ,SuggsEG.Setosphaeriaprolataistheascigenousstateof Exserohilumprolata.Mycologia, 1974;66:181-297.
3. Dharanendra SS. Studies on turcicum leaf blight of maize caused by Exserohilumturcicum, M.Sc. Agric Thesis, University of Agricultural Sciences, Dharwad, KarnatakaIndia,2003.
4. Harlapur SI. Epidemiology and management of turcicum leaf blight of maize causedby Exserohilum turcicum Pass Leonard and Suggs, PhD. Thesis, University ofAgricultural

Sciences,Dharwad,Karnataka,India,2005.

5. Pant SK, Kumar P, Chauhan VS, Effect of turcicum leaf blight on photosynthesis inmaize.IndianPhytopathology,2000; 54:251-252.

6. PayakMM,RenfroBL.Combatingmaizedisease.Ind.FarmerDis,1968;1:53-58.

7. Ferguson LM, Carson ML. Spatial diversity of Setosphaeria turcica sampled fron theEastern United States.Phytopathology,2004; 94:892-900.

8. HenryRJ,Kettlewell PS.Cereal grainquality,Chapman andHall,1996.

9. VanderplankJE.PlantDiseaseEpidemicandControl,Academicpress,NewYork,1963,349.

10. Harlapur SI, Kulkarni MS, Wali MC, Kulkarni S, Yashoda H, Patil BC. Status ofTurcicum Leaf Blight of Maize in Karnataka. Kar J of AgriSci.2008;21(1):55-60.

11. Pant SK, Kumar P, Chauhan VS, Effect of turcicum leaf blight on photosynthesis inmaize.IndianPhyto.2000; 54:251-252.

12. PayakMM,RenfroBL.Combatingmaizedisease.Ind.FarmerDis,1968;1:53-58.

13. Ferguson LM, Carson ML. Spatial diversity of Setosphaeria turcica sampled fron theEastern United States.Phyto.2004; 94:892-900.

14. HenryRJ,Kettlewell PS.Cereal grainquality,Chapman andHall,1996.

15. VanderplankJE.PlantDiseaseEpidemicandControl,Academicpress,NewYork.1963,349.

16. Harlapur SI, Kulkarni MS, Wali MC, Kulkarni S, Yashoda H, Patil BC. Status ofTurcicum Leaf Blight of Maize inKarnataka. Kar J AgriSci.2008;21(1):55-60.