

Performance of Peddapuram Station Maize Pre Release Hybrids to different diseases in all India testing during Kharif 2022

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ABSTRACT

Diseases caused by pathogens are one among the major causes of yield loss in maize. These diseases not only affect its yield but can greatly impair the quality and year-wise stability of production, undermining the efforts to promote sustainable agriculture. Moreover, environmental and health hazards, resulting from the non-judicious application of numerous chemical fungicides are another cause of concern. Though maize is affected by more than 60 diseases, in India about a dozen are of serious concern. The four major diseases viz; turicum leaf blight (TLB), maydis leaf blight (MLB), post-flowering stalk rots (PFSR), and banded leaf and sheath blight (BLSB) are of national importance. Host plant resistance (HPR) is considered to be most practical, feasible and effective way to control plant diseases. Though diseases can be managed through chemicals, these are neither farmer- nor environment-friendly. These are serious threat to soil and human health too. Further use of chemicals makes maize cultivation costly, reducing profit margin. Therefore, exploitation of HPR helps in minimizing inoculum in soil and yield loss in an eco-friendly and economic manner. One of the best approaches to address different diseases is to identify highly tolerant or resistant genotypes that can be used for genetic improvement. In present investigation three hybrids PH 22-420146, PH 22-420186 and PH 22-420208 were screened against major diseases of maize in different locations in India, among these PH 22-420208 showed resistance to *Fusarium* stalk rot, *Curvularia* leaf spot, sorghum downy mildew, Rajasthan downy mildew diseases and moderately resistance to maydis leaf blight, Charcoal rot and banded leaf and sheath blight diseases.

Key words: Maize pre-release hybrids, Plant diseases, Plant pathogens

Introduction

Maize is important to India as 15 million Indian

farmers are engaged in Maize cultivation. Having realized the potential of Maize in generating better income to farmers while providing gainful employ-

ment, Maize qualifies as a potential crop for doubling farmer's income. There is a tremendous potential of growth of the Maize value chain in the country. The consumption of Maize has increased at a CAGR of 11% in last five years. Today, Maize is a source of more than 3500 products including specialized Maize like QPM "Quality Protein Maize". These trends open up vistas of opportunity for India's Maize sector. In the Indian context, not less than 15 million farmers are engaged in maize cultivation and it generates employment for more than 650 million person-days at farming and its related business ecosystem levels. Importantly, maize contributes more than 2 per cent to the total value of output from all agricultural crops. The crop is less water demanding than other similar cereals and being a 'C4' as well as 'dayneutral plant', it gives

higher yield per hectare in a shorter period and can be grown in any season. The multiple utilities of maize as a 'food', 'fodder' and 'feed' makes it further more demand friendly and insulates it against low demand situations. These unique characteristics of maize make the crop a suitable crop candidate for enhancing farmer's income and livelihoods in India.

Materials and Methods

Field experiment was performed at different AICRP centres to screen the pre release hybrids under artificially created Epiphytotic against major diseases of maize via., Maydis leaf blight, Turcium leaf blight, Banded leaf sheath blight, Charcoal rot, Fusarium stalk rot, Sorghum downy mildew. Rajasthan downy mildew and Curvularia leaf spot.

Table 1. Details of disease rating scale, inoculation time and method and scoring time for various diseases.

S.No.	Disease Name	Inoculation time	Rating Scale	Observation time	Inoculation method
1	Maydis leaf blight	30-35 days after sowing	1-9 Hooda <i>et al.</i> , 2018	30-35 days after inoculation	Sorghum grain culture into the whorl
2	Turcium leaf blight	30-35 days after sowing	1-9 Hooda <i>et al.</i> , 2018	30-35 days after inoculation	Conidial suspension spray of soaked inoculated sorghum grains into the whorl
3	Banded leaf sheath blight	30-35 days after sowing	1-9 Hooda, <i>et al.</i> , 2018	30-35 days after inoculation	Sorghum grain culture inserted at 2 nd or 3 rd leaf sheath from soil level
4	Charcoal rot	50-55 days after sowing	1-9 Hooda <i>et al.</i> , 2018	40-45 days after inoculation (At harvesting stage)	Toothpick inoculation on lower internode (second/third) above soil level
5	Fusarium Stalk rot	50-55 days after sowing	1-9 Hooda <i>et al.</i> , 2018	40-45 days after inoculation (At harvesting stage)	Toothpick inoculation on lower internode (second/third) above soil level
6	Sorghum downy mildew	8-10 days after sowing) at 2.00 to 3.00 am	1-100% (Disease incidence) Hooda <i>et al.</i> , 2018	20 days after inoculation and 30 days after inoculation	Conidial suspension spray with hand compression sprayer
7	Rajasthan downy mildew	7-10 days after sowing at 2.00 to 5.00 am	1-100% (Disease incidence) Hooda, <i>et al.</i> , 2018	30 and 45 days after inoculation	Conidial suspension drops in whorls with dropping bottle
8	Curvularia leaf spot	45 days after sowing	1-9 Hooda, <i>et al.</i> , 2018	20, 35 and 50 days after inoculation	Conidial suspension of soaked inoculated sorghum grains

Conclusion

Thus, from the present investigation, new sources of resistance were identified through artificial epiphytotics. This can cater to the resistance breeding programme by combating with the new races of

pathogens that would be emerging continuously and susceptibility of some resistance sources. This result would also be useful in improvement of maize hybrids through population improvement programmes for sustainable productivity.

AICRP Center identified promising pre-release hybrids against major diseases of maize.

Disease	No. of Locations	Name of the locations	PH22-420146		PH22-420186		PH22-420208	
			Score	Reaction	Score	Reaction	Score	Reaction
Maydis leaf blight	04	DELH	3.2	MR	2.9	R	2.5	R
		KARN	5.0	MR	4.1	MR	4.8	MR
		LUDH	5.7	MS	5.0	MR	5.1	MS
		DHOL	5.9	MS	4.7	MR	6.7	MS
Turcicum leaf blight	03	DHAR	5.2	MS	6.8	MS	6.0	MS
		MAND	2.6	R	4.0	MR	4.8	MR
		RAHU	5.2	MS	4.5	MR	4.5	MR
Banded leaf sheath blight	04	DELH	3.9	MR	3.3	MR	4.3	MR
		KARN	5.4	MS	3.1	MR	4.5	MR
		PANT	6.5	MS	5.1	MS	5.1	MS
		PEDD	8.7	S	8.8	S	8.6	S
Charcoal rot	03	LUDH	5.0	MR	7.0	MR	3.8	MR
		COIM	3.3	MR	2.3	R	2.2	R
		HYDE	3.8	MR	5.0	MR	5.4	MS
Fusarium stalk rot	01	UDAI	3.3	MR	3.9	MR	3.0	R
Sorghum downy mildew	01	MAND	100	S	90.3	S	27.5	R
Rajasthan Downy mildew	01	UDAI	25.2	R	11.3	R	11.8	R
Curvularia leaf spot	01	UDAI	3.0	R	3.6	MR	1.3	R

* R- Resistant (Score 1.0-3.0)

* MR – Moderately Resistant (Score : 3.1-5.0)

* MS – Moderately Susceptible (Score : 5.1 – 7.0)

* S – Susceptible (Score : 7.1-9.0)