J. Mycopathol. Res. **61(3)** : 397-403, 2023; ISSN : 0971-3719 (Print), 2583-6315 (Online) doi. 10.57023/JMycR.61.3.2023.397

Evaluation of fungicides for the management of pearl millet [*Pennisetum glaucum (L.)*] blast caused by *Pyricularia grisea* under field condition

DINESH H CHAUDHARY[1], R. S. JAIMAN[2] AND MAHESH M. CHAUDAHRY[3]

[1]Directorate of Research, Navsari Agricultural University, Navsari- 396450 ,Gujarat
[2] C. P. College of Agriculture, S. D. Agricultural University, S. K. Nagar-385506, Gujarat
[3]Sumitomo Chemical India Ltd, Bhavnagar- 364 005, Gujarat

Received : 25.05.2023 Accepted : 27.07.2023 Published : 25.09.2023

Blast disease caused by *Pyricularia grisea* is a major problem and a serious threat to pearl millet productivity. Most of the hybrids being grown in India are susceptible to blast, as not much effort has been made to breed for blast resistance in pearl millet. In the absence of host plant resistance, the disease can be effectively managed with chemical fungicides. Therefore, seven fungicides (Tricyclazole 75% WP, Edifenphos 50% EC, Carbendazim 50% WP, Tricyclazole 18% + Mancozeb 62% WP, Tricyclazole 45% + Hexaconazole 10% WG, Propiconazole 10.7% + Tricyclazole 34.2% SE, Carbendazim 12% + Mancozeb 63% WP) were tested for their efficacy to manage blast disease on a blast susceptible pearl millet line (ICMB 9544). Results of this study clearly demonstrated that the disease can be effectively managed with two sprays of Tricyclazole + Hexaconazole @ 0.05% recorded lowest PDI (19.22%) and AUDPC value (824.58 units) while highest grain and fodder yields of 1857.50 kg/ha and maximum disease intensity of 67.92% recorded in the control (without spray).

Keywords: Blast, Disease intensity, Disease progress curve, Fungicide,Pearl millet, Percent disease reduction, *Pyricularia grisea*

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the most widely cultivated cereal for the majority of small land holders and it's well known as poor man's food in Asian and African subcontinent. It accounts for almost half of global millet production and also consumed as feed and fodder for livestock. India is the largest single producer of the crop, both in terms of area (9.3 million hectares) and production (8.3 million tons) with productivity of 1243 kg/ha (Anon., 2020). The major growing states are Rajasthan, Maharashtra, Uttar Pradesh, Gujarat and Haryana contributing 90% of total national production.Pearl millet crop is infected by many diseases at different growth stage which causes yield reduction and economic losses to grower.

*Correspondence:dhchaudhary@nau.in

Among several important diseases blast (*Pyricularia grisea*) disease has emerged as serious disease which affecting both forage and grain production of pearl millet (Thakur *et al.*2011). In this era of rapidly increasing world population, blast disease of pearl millet is major contributor to the yield gap and limitations to increase cultivated land and non-availability of water for irrigation, reducing the loss due to blast can prove to be a critical component towards mitigating the world food security (Sharma *et al.*2012). The efficacy of various systemic and broad-spectrum fungicides has gained favour for blast management throughout the world especially in temperate or subtropical regions. The fungicides have efficiency to control leaf blast up to a range of 40 to 84 per cent (Swamy *et al.* 2009).

However, during the selection of fungicides low toxicity to humans and wildlife, low environmental impact, low residues in food, and compatibility with integrated pest management programs are

increasingly important considerations for development. In view of the above facts, this research aimed to determine comparative efficacy of different foliar fungicides and their least possible concentrations in controlling leaf blast and enhancing grain yield.

MATERIALS AND METHODS

Field preparation and experiment layout

The field experiment was conducted during kharif seasons of 2018 and 2019 at Centre for Crop Improvement, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. The trials were laid out in a randomized block design with eight treatments and three replications. The highly susceptible cultivar ICMB 95444 was sown in row to row 45 cm and plant to plant 10 cm apart in plot size of 4.00 m × 3.60 m. The fertilizers, 80 :40 (N: P2O5) kg/ha were applied, in which N was applied in two equal doses as basal and top dressing at 30 days after sowing. Experiment was kept free from weeds and insect pests as well as irrigation schedules follow as and when necessary.

Fungicides treatment and spray schedule

Seven fungicides listed in (Table 1)evaluated against blast of pearl millet under natural conditions in the field were sprayed just after initiation of disease and second spray at 15 days interval after first spray. The treatment without spray served as check. Randomly selected ten plants were assessed individually from each treatment and the results were analyzed statistically. The data on percent disease intensity of blast was recorded seven day after first spray to before harvesting at seven day interval along with pearl millet yield by using 0-9 rating scale.

Inoculum preparation and inoculation

Magnaporthe grisea isolate Pg 11, collected from pearl millet fields at Centre for Crop Improvement, SDAU, S. K. Nagar was used in this study. Inoculum of the isolate Pg 11 was prepared according to the procedure described by Sharma *et al.* (2013). The spore suspension was prepared using sterilised distilled water, adjusted to a desired concentration (1×10^5 spores/ml) using a haemocytometer (Fisher Scientific) and a drop of surfactant Tween 20 (Hi Media) was added to ensure the uniform dispersal of spores. The crop (30 days old seedlings) was spray inoculated with an aqueous conidial suspension using a hand operated Knapsack sprayer. Perfo-irrigation was provided to the crop twice a day 30 min each in the morning (between 9 and 10 a.m.) and in the afternoon (between 4 and 5p.m.) on rain-free days to maintain high relative humidity and leaf wetness to facilitate fungal infection and disease development.

Disease assessment and analysis

blast severity was measured visually as percent infected foliage at seven days after inoculation, and further measurement was done upto 35 days at seven days intervals. The disease severity values at each recording were used to calculate the area under the disease progress curve (AUDPC). The AUDPC was calculated using the formula:

$$AUPDC = \sum_{i=1}^{n-1} \left(\frac{y_i + y_{i+1}}{2} \right) \left(t_{i+1} - t_i \right)$$

where "t" is present disease severity at each reading and 'n' is the number of readings.

Disease severity recorded at 35 dys after inoculation was used to calculate the present disease index was calculated by using the following formula (Wheeler,1969).

The percent disease reduction (PDR) was calculated by using the following formula :

$$\text{Percent disease intensity} = \frac{\text{Sum of individual disease ratings}}{\text{Number of leaves observed x Max. Grade}} \times 100$$

$$\text{Percent disease reduction} = \frac{\text{Disease severity in control} - \text{disease-severity in treatment}}{\text{Disease severity in control}} \times 100$$

RESULTS AND DISCUSSION

The disease symptoms were clearly visible seven days after inoculation in the untreated control. Hence, the first observation was made at seven days after inoculation.

Per cent disease intensity (Year 2018)

Perusal of data presented in (Table 3)revealed that all the fungicides tested in field condition were

Table 2: Effect of different fungicides on blast (*Pyricularia gresia*) of pearl millet (*Kharif* season 2018 and 2019)

Sr. No	Treatments	Conc.	Per cent Disease Intensity			Per cent reduction over control			AUDPC		
			2018	2019	Pooled	2018	2019	Pooled	2018	2019	Pooled
		(%)									
1.	Tricyclazole 75 %WP	0.05	29.86^{ef} (24.81)	30.49^{d} (25.78)	30.17^{f} (25.29)	62.28	63.20	62.74	832.98^{e}	823.70^{e}	828.34^{e}
2.	Edifenphos 50% EC	0.1	35.34^{cd} (33.48)	36.96^{c} (36.15)	36.15^{cd} (34.81)	49.10	48.41	48.75	1110.13^{bcd}	1099.51^{bcd}	1104.82^{bcd}
3.	Carbendazim 50 % WP	0.05	33.75^{de} (30.89)	34.03^{cd} (31.33)	33.89^{de} (31.11)	53.04	55.28	54.19	997.37^{cde}	967.37^{cde}	982.37^{cde}
4.	Tricyclazole 18% + Mancozeb 62% WP	0.05	38.39^{bc} (38.59)	38.23^{bc} (38.80)	38.31^{bc} (38.70)	41.33	44.63	43.02	1217.49^{bc}	1165.86^{bc}	1191.68^{bc}
5.	Tricyclazole 45% + Hexaconazole 10% WG	0.05	25.67^{g} (18.81)	26.29^{e} (19.63)	25.98^{f} (19.22)	71.41	71.98	71.70	848.83^{e}	800.34^{e}	824.58^{e}
6.	Propiconazole 10.7% + Tricyclazole 34.2% SE	0.1	30.83^{ef} (26.30)	32.42^{d} (28.81)	31.63^{e} (27.56)	60.01	58.88	59.42	888.51^{de}	874.24^{de}	881.38^{de}
7.	Carbendazim 12% + Mancozeb 63% WP	0.05	41.11^{b} (43.26)	42.22^{b} (45.19)	41.67^{b} (44.22)	34.24	35.50	34.89	1336.51^{b}	1343.24^{b}	1339.88^{b}
8.	Control	-	54.25^{a} (65.78)	56.95^{a} (70.07)	55.61^{a} (67.92)	-	-	-	2181.60^{a}	2119.18^{a}	2150.39^{a}
	S.EM.±		1.30	1.49	1.59				81.95	81.98	57.33
	C.D. @ 5.0%		3.96	4.51	4.62				245.97	245.96	166.09
	C.V.%		6.25	6.92	10.83				11.93	12.22	12.07

Figures in parentheses are retransformed value of arcsin transformation,
Treatment means with the common letters(s) are non-significant by Duncan's New Multiple Range Test at 5% level of significance

Table 3: Effect of different fungicides on Yield of pearl millet during (*Kharif*) 2018 and 2019

Sr. No	Treatments	Conc. (%)	Yield						Per cent yield increase over control (%)	
			Grain kg/ha			Fodder kg/ha			Grain	Fodder
			2018	2019	Pooled	2018	2019	Pooled		
1.	Tricyclazole 75 %WP	0.05	1420.00^{b}	1471.61^{b}	1445.81^{b}	1920.00^{b}	1883.33^{b}	1901.67^{b}	62.51	61.22
2.	Edifenphos 50% EC	0.1	1048.67^{cde}	1131.67^{cd}	1090.17^{cde}	1425.25^{de}	1468.33^{d}	1446.79^{de}	50.31	49.02
3.	Carbendazim 50 % WP	0.05	1211.67^{bcd}	1211.67^{c}	1211.67^{bcd}	1633.33^{cd}	1658.33^{cd}	1645.83^{cd}	55.30	55.19
4.	Tricyclazole 18% + Mancozeb 62% WP	0.05	1033.33^{de}	936.67^{de}	985.00^{de}	1345.00^{e}	1225.00^{e}	1285.00^{ef}	45.00	42.47
5.	Tricyclazole 45% + Hexaconazole 10% WG	0.05	1850.00^{a}	1865.00^{a}	1857.50^{a}	2270.00^{a}	2415.00^{a}	2342.50^{a}	70.84	68.49
6.	Propiconazole 10.7% + Tricyclazole 34.2% SE	0.1	1290.00^{bc}	1290.00^{bc}	1290.00^{bc}	1746.67^{bc}	1716.67^{bc}	1731.67^{bc}	58.01	57.40
7.	Carbendazim 12% + Mancozeb 63% WP	0.05	876.67^{e}	858.33^{e}	867.50^{e}	1183.33^{e}	1130.00^{e}	1156.67^{f}	37.56	36.20
8.	Control (Water only)	-	550.00^{f}	533.33^{f}	541.66^{f}	733.33^{f}	741.67^{f}	737.50^{g}	-	-
	S.EM.±		78.35	80.37	56.12	79.83	70.74	53.33		
	C.D. @ 5.0%		237.66	243.76	162.57	242.14	214.57	154.50		
	C.V.%		11.70	11.98	11.84	9.02	8.01	8.53		

Figures in parentheses are retransformed value of arcsin transformation,
Treatment means with the common letters(s) are non-significant by Duncan's New Multiple Range Test at 5% level of significance

Table 4: An economic analysis of fungicides against blast disease of pearl millet under field condition

Tr. No.	Treatments	Conc. (%)	Cost of chemical (Rs.)/lt or Kg	Qty required/ ha in ml/gm	Total cost of chemical/ha (Rs.)	Cost of cultivation (Rs.)	Total cost (Rs.)	Yield* (kg/ha)		Total returns (Rs.)	Net returns (Rs.)	B:C
								Grain	Fodder			
1	2		3	4	5	6	7 (5 +6)	8		9	10(9--7)	11 (9/7)
T_1	Tricyclazole 75% WP	0.05	1666	670	1116	13200	14316	1445.81	1901.67	38612	25412	1:1.77
T_2	Ediphenphos 50% EC	0.1	885	2000	1770	13200	14970	1090.17	1446.79	29205	16005	1:1.07
T_3	Carbendazim 50% WP	0.05	1240	1000	1240	13200	14440	1211.67	1645.83	32725	18285	1:1.27
T_4	Tricyclazole 18% + Mancozeb 62% WP	0.05	1180	625	738	13200	13938	985.00	1285.00	26232	12294	1:0.88
T_5	Tricyclazole 45% + Hexaconazole 10% WG	0. 05	1800	910	1638	13200	14838	1857.50	2342.50	48910	34072	1:1.91
T_6	Propiconazole 10.7% + Tricyclazole 34.2% SE	0.1	1340	2225	2980	13200	16180	1290.00	1731.67	34897	18717	1:1.15
T_7	Carbendazim 12% + Mancozeb 63% WP	0.05	600	670	400	13200	13600	867.50	1156.67	23278	9678	1:0.71
T_8	Control (Water only)	-	-	-	-	13200	13200	541.66	737.50	14641	-	-

*Means of two year.
Price of pearl millet grain @ 350/- per 20 kg, fodder 140/- per 1 kg, Labour charge @ 300/ day,
Quantity of fungicides calculated by 1000 lit. for two sprays.
Cost of cultivation including ploughing, seeds, seeds sowing, fertilizer, Irrigation, interculturing, labour cost for harvesting and threshing

significantly reduced blast disease intensity as compared to control. The significantly minimum blast disease intensity (18.81%) was recorded in tricyclazole 45% + hexaconazole 10% WG (0.05%) with maximum (71.41%) disease reduction over control followed by tricyclazole 75 % WP (0.05%) recorded (24.81%) disease intensity with 62.28 per cent disease reduction over control which was at par with propiconazole 10.70% + tricyclazole 34.2% SE (0.1%) recorded 26.30 per cent disease intensity with 60.01 per cent disease reduction over control. The next best effective fungicides in merit in relation to per cent disease intensity were carbendazim 50% WP (0.05%), edifenphos 50 EC (0.1%), tricyclazole 18% + mancozeb 62% WP (0.05%), carbendazim 12% + mancozeb 63% WP (0.05%) and recorded 30.89%, 33.48%, 38.59% and 43.26% disease intensity with 53.04, 49.10, 41.33 and 34.24 per cent disease reduction, respectively and these treatment found at par with each other. The maximum disease intensity (65.78%) was recorded in control (without spray).

Per cent disease intensity (2019)

Data presented in Table 2revealed that all the fungicides tested in field condition were significantly reduced blast disease intensity as compared to control. The minimum blast disease intensity (19.63%) was recorded in tricyclazole 45% + hexaconazole 10% WG (0.05%) with maximum (71.98%) per cent disease reduction over control followed by tricyclazole 75% WP (0.05%) were 25.78 per cent disease intensity and 63.20 per cent disease reduction over control which was at par (28.81%) with propiconazole 10.70% + tricyclazole 34.2% SE (0.1%) with 58.88 per cent disease reduction over control. The next best effective treatment in merits were carbendazim 50% WP (0.05%), edifenphos 50% EC (0.1%), tricyclazole 18% + mancozeb 62% WP (0.05%) and carbendazim 12% + mancozeb 63% WP (0.05%) and recorded 31.33%, 36.15%, 38.80% and 45.19% disease intensity with 55.28, 48.41, 44.63 and 35.50 per cent disease reduction over control,

respectively. These treatments were found statistically at par with each other. The maximum blast disease intensity (70.07%) was recorded in control (untreated plot).

Per cent disease intensity (Pooled)

All the treatments tested were significantly reduced disease as compared to control. The minimum blast disease intensity (19.22%) was recorded in tricyclazole 45% + hexaconazole 10% WG (0.05%) with maximum (70.71%) disease reduction over the control which was at par with tricyclazole 75% WP (0.05%) recorded 25.29 per cent disease intensity with 62.74 per cent disease reduction over the control. The next best effective fungicides in merit in reduction to percent disease intensity were propiconazole 10.70% + tricyclazole 34.2% SE (0.1%), carbendazim 50% WP (0.05%) , edifenphos 50% EC (0.1%), tricyclazole 18% + mancozeb 62% WP (0.05%), carbendazim 12% + mancozeb 63% WP (0.05%) and recorded 27.55%, 31.11%, 34.81%, 38.44% and 44.22 per cent disease intensity with 59.42%, 54.19%, 48.75% , 43.02% and 34.89 per cent disease reduction, respectively and these treatments found at par with each other. The maximum disease intensity (67.92%) recorded in control (without spray).

AUDPC (2018)

Perusal of data presented in Table 2 revealed that all the fungicides tested in field condition were significantly reduced disease as compared to control in relation to area under disease progress curve. Lowest AUDPC value (832.98) was found in tricyclazole 75% WP which was at par with tricyclazole 45% + hexaconaole 10% WG (848.83). The best treatments in merit were propiconazole 10.7% + tricyclazole 34.2% SE (888.51), carbendazim 50% WP (997.37), edifenphos 50% EC (1110.13), tricyclazole 18% + mancozeb 62% WP (1217.49), carbendazim 12% + mancozeb 63% WP (1336.51) and all the treatments were found at par with each other. Maximum AUDPC value (2181.60) was observed in control.

AUDPC2019

All the treatments were found significantly in reducing disease as compared to control in reduction to area under disease progress curve. Lowest AUDPC value (800.34 units) was found in tricyclazole 45% + hexaconaole 10% WG which was at par with tricyclazole 75% WP (823.70) units. The next best treatments in merit were propiconazole 10.7% + tricyclazole 34.2% SE (874.24), carbendazim 50% WP (967.37), edifenphos 50% EC (1099.51), tricyclazole 18% + mancozeb 62% WP (1165.86) and carbendazim 12% + mancozeb 63% WP (1343.24). All the treatments were found at par with each other treatments. The maximum AUDPC value (2119.18 units) was observed in control (no spray).

AUDPC (Pooled)

In relation to area under disease progress curve were found significantly in all the fungicides tested. Lowest AUDPC value (824.58 units) was recorded in tricyclazole 45% + hexaconaole 10% WG which was at par with tricyclazole 75% WP (828.34). All the fungicides were found at par with each other. The next best treatments in merit were propiconazole 10.7% + tricyclazole 34.2% SE (881.38), carbendazim 50% WP (982.37), edifenphos 50 EC% (1104.82), Tricyclazole 18% + mancozeb 62% WP (1191.68) and carbendazim 12% + mancozeb 63% WP (1339.88). The maximum AUDPC value (2150.39) was observed in control (without spray).

It has been shown that tricyclazole belongs melanin biosysnthesis inhibitors (MBI) group of fungicide and prevent melanin biosynthesis in appressoria of *Pyricularia oryzae* and penetration of pearl millet plant via appressoria by inhibiting polyhydroxynapthaline reductase (Nath and Mondal, 2020). In the present investigation, application of tricyclazole 45% + hexaconazole 10% WG revealed best followed by tricyclazole 75% WP in reducing leaf blast severity. These treatments can be recommended to the farming community for sustainable management of the disease.

Effectiveness of tricyclazole 45% + hexaconazole 10% WG on blast of paddy were recorded by many workers viz., Magar *et al*. (2015), Singh *et al*. (2017) and Hosagoudar (2018). Effectiveness of tricyclazole 75% WP on blast of paddy were also recorded by many workers viz., Prajapati *et*

al.(2004), Pandey (2016), Neelkanth *et al*.(2017), Nirmalkar *et al*. (2017) and Upamanya *et al*. (2019). Joshi and Gohel (2015) also observed effectiveness of tricychlozole against pearl millet blast. Udhayakumar *et al*.(2019) observed effectiveness of propiconazole 10.7% + tricyclazole 34.2% EC on blast of paddy and Lukose *et al*.(2007) noted effectiveness of carbendezim 50% WP on pearl millet blast while, Upamanya and Manuja (2016) observed effectiveness of tricychlozole18% + mancozeb 62% WP on blast of rice.

Grain and Fodder yield (Year 2018)

The data presented in Table 3revealed that all the treatments were found significantly superior in relation to grain and fodder yield. The maximum 1850 kg/ha grain and 2270 kg/ha fodder yield was obtained from the plots treated with tricyclazole 45% + hexaconazole 10% WG which was followed by tricyclazole 75% WP with 1420 kg/ha grain and 1920 kg/ha fodder yield, which was at par with propiconazole 10.7% + tricyclazole 34.2% SE with 1290.00 kg/ha grain and 1746.67 kg/ha fodder yield. The next best treatment in merits were carbendazim 50% WP, edifenphos 50% EC and tricyclazole 18% + mancozeb 62% WP with 1211.67, 1048.67 and 1033.33 kg/ha grain and 1633.33, 1425.25 and 1345 kg/ha fodder yield, respectively. All the treatment were found at par with each other. The significantly minimum 876.67 kg/ha grain and 1183.33 kg/ha fodder yield was recorded in carbendazim 12% + mancozeb 63% WP as compared to control 550 kg/ ha grain and 733.33 kg/ha fodder yield.

Grain and Fodder yield (Year 2019)

All the treatments were found significantly superior in relation to grain and fodder yield. The maximum 1865 kg/ha grain and 2415 kg/ha fodder yield were obtained from the plots treated with tricyclazole 45% + hexaconazole 10% WG which was followed by tricyclazole 75% WP with 1471.61 kg/ha grain yield and 1883.33 kg/ha fodder yield. The next best treatment in merits were propiconazole 10.7% + tricyclazole 34.2 SE%, carbendazim 50% WP, edifenphos 50% EC and tricyclazole 18% + mancozeb 62% WP with 1290.00, 1211.67, 1131.67 and 936.67 kg/ha grain yield and 1716.67, 1658.33, 1468.33 and 1225 kg/ha fodder yield, respectively. All the treatments were found at par with each other. The significantly minimum 858.33 kg/ha grain yield and 1130 kg/ha fodder yield was recorded in carbendazim 12% + mancozeb 63% WP as compared to control 533.33 kg/ha grain yield and 741.67 kg/ha fodder yield.

Grain and Fodder yield (Pooled)

All the treatments were found significantly superior. The maximum 1857.50 kg/ha grain and 2342.50 kg/ha fodder yield were obtained from the plots treated with tricyclazole 45% + hexaconazole 10% WG, which was followed by tricyclazole 75% WP recorded 1445.81 kg/ha grain and 1901.67 kg/ha fodder yield. The next best treatment in merits were propiconazole 10.7% + tricyclazole 34.2% SE, carbendazim 50% WP, edifenphos 50% EC and tricyclazole 18% + mancozeb 62% WP recorded 1290, 1211.67, 1090.17 and 985.00 kg/ha grain yield and 1731.67, 1645.83, 1434.29 and 1285kg/ ha fodder yield, respectively. All the treatments were found statistically at par with each other. The significantly minimum 867.50 kg/ha grain and 1156.67 kg/ha fodder yield was recorded in carbendazim 12% + mancozeb 63% WP as compared to control 541.66 grain kg/ha and 737.50 kg/ha fodder yield.

Fungicides economics

The results of data are presented in (Table 4)revealed that highest net returns (Rs. 34072/ ha) with 1:1.9 cost benefit ratio over control was recorded in treatment of tricyclazole 45% + hexaconazole 10% WG which was followed by tricyclazole 75% WP with net returns Rs. 25412/ ha and 1:1.77 cost benefit ratio. The next treatments in merits were propiconazole 10.7% + tricyclazole 34.2% SE with Rs.18717/ha net return with (1:1.15) cost benefit ratio, carbendazim 50% WP recorded Rs. 18285/ ha with (1:1.27), edifenphos 50% EC recoded Rs. 16005/ha with (1:1.07), tricyclazole 18% + mancozeb 62% WP recorded Rs 12294/ha with (1:0.88). Minimum incremental cost benefits ratio was recorded in

carbendazim 12% + mancozeb 63% WP (1:0.71) with Rs. 9678/ha net return.

CONCLUSION

Thus, it can be concluded that blast of pearl millet effectively managed by two foliar sprays at 15 days interval starting from initiation of disease with tricyclazole 45% + hexaconazole 10% WG (0.05%) or tricyclazole 75% WP (0.05%) or propiconazole 10.70% + tricyclazole 34.2% SE (0.1%).

ACKNOWLEDGEMENTS

We are thankful to all the staff members of Centre for crop improvement, Agronomy farm and Central library, S. D. Agricultural University, Sardarkrushinagar for their kind co-operation, technical guidance and support during my research work.

REFERENCES

Hosagoudar, G. N. 2018. Evaluation of fungicides for the management of blast diseases of rice under field condition. *J. Pharmacog. Phytochem.* **7**: 1948-1951.

Joshi, H. D., Gohel, N. M. (2015). Management of blast [*Pyricularia grisea* (Cooke) Sacc.] disease of pearl millet through fungicides. *The Bio Scan***10**: 1855-1558.

Lukose, C. M., Kadvani, D. L., Dangaria, C. J. 2007. Efficacy of fungicides in controlling blast disease of pearl millet. *Ind. Phytopathol.***60**: 68-71.

Magar, P. B., Acharya, B., Pandey, B. 2015. Use of chemical fungicides for the management of rice blast (*Pyricularia grisea*) disease at Jyoti nagar. Chitwan, Nepal. *Inter. J. Appl. Sci. Biotechnol.* **3**: 474-478.

Neelakanth., Sidde Gowda, D. K.; Chethana, B. S., Parasappa, H. H. 2017. *In vitro* and *in vivo* evaluation of fungicides against *Pyricularia oryzae* causing blast of rice. *Inter. J.Pure Appl. Biosc.***5**: 259-263.

Nirmalkar, V., Said, P. P., Kaushik, D. 2017. Efficacy of fungicides and bio-agents against Pyricularia gresia in paddy and yield gap analysis thought frontline demonstration. Inter. J. Curr. Microbiol. Appl.Sci. **6**: 2338-2346.

Pandey, S. 2016. Effect of fungicides on leaf blast and grain yield of rice in kymore region of Madhya Pradesh in India. *Bangladesh J. Bot.***45**: 353-359.

Prajapati, K. S., Patel, R. C., Pathak, A. R.2004. Field evaluation of new fungicides against blast of rice. *Pesticide Res. J.***16:** 26-28.

Sharma, R., Upadhyaya, H. D., Manjunatha, S. V., Rai, K. N., Gupta, S. K. ,Thakur, R. P. 2013. Pathogenic variation in the pearl millet blast pathogen *Magnaporthe grisea* and identification of resistance to diverse pathotypes. *Plant Dis.* 97: 189-195.

Singh, R., Sunder, S., Ram, M.2017. Identification of resistant sources and management of rice blast through fungicides. *Indian Phytopath.*.**70**: 500-502.

Swamy, H. N., Syed, S., Kumar, M. D. 2009. Evaluation of new fungicides against rice blast in Cauvery delta. Karnataka *J. Agric. Sci.* **22**: 450-451.

Thakur, R. P., Sharma, R., Rao, V. P. 2011. Screening techniques for pearl millet diseases. Information Bulletin No. 89. International Crops Research Institute for the Semi-Arid Tropics. pp56

Udhayakumar, R., Muthukumar, A., Kanagarajan, R. 2019. Evaluation of filia 52.5 se (Tricyclazole 34.2% + propiconazole 10.7%) against rice blast disease. *J. Pharmacog. Phytochem.* **8**: 396-399.

Upamanya, G. K. R., Choudhury, B., Deka, P., Sarma, R. 2019. Response of different varieties of finger millet against diseases and evaluation of efficacy of fungicides against leaf blast. *Inter.J. Recent Scient. Res.* **10**: 655-658.

Upmanyu, S., Manuja, S.2016. Evaluation of new fungicides for the management of neck blast in rice (Oryza sativa L.). *Himachal J. Agricult.Res.***42**: 114-116.