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EVALUATION OF EFFICACY OF FUNGICIDES AGAINST FOLIAR BLIGHT OF WHEAT CAUSED BY *BIPOLARIS SOROKINIANA* UNDER IN VIVO CONDITION

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ABSTRACT

A field experiment was conducted at the Research Farm of Wheat Research Station, Junagadh Agricultural University, Junagadh to study the efficacy of fungicides in managing the foliar blight of wheat incited by *Bipolaris sorokiniana* under field condition during Rabi 2024-25. The result indicated that, tebuconazole 50 + trifloxystrobin 25 WG was significantly superior over the rest of the treatments and showed minimum disease intensity (17.71%) at 0.05 % concentration with 75.75 per cent disease control. The next effective treatment was propiconazole 25 EC (27.72 %) found statistically at par with tebuconazole 25.9 EC (33.31 %) at 0.01 % concentration with corresponding disease control of 62.12 and 54.54 per cent, respectively. Similarly, the treatment tebuconazole 50 + trifloxystrobin 25 WG at 0.05 per cent gave maximum seed yield (4063 kg/ha) with 88.99 per cent yield increased over control, but it was remained statistically at par with propiconazole 25 EC at 0.01 per cent (3767 kg/ha), tebuconazole 25.9 EC at 0.01 per cent (3733 kg/ha) with 75.19 and 73.64 per cent yield increase over control, respectively. Whereas, control treatment recorded maximum disease intensity of 75.37 with minimum seed yield of 2150 kg/ha.

Introduction

Wheat is known as the “King of Cereals”. Wheat (*Triticum aestivum* L.) is the primary staple meal for around 36 per cent of the global population (Kumar *et al.*, 2019). The fact that a bearded wheat spike is the focal point of the FAO emblem illustrates the significance of wheat on a global scale. Wheat crop is susceptible to a number of diseases caused by fungi, bacteria, viruses and nematodes. Approximately one-tenth of the global production is given by India. Wheat cultivation has traditionally been concentrated in Northern India. In India, wheat is grown throughout the winter season. In 2022-23, India produced 112.743 metric tonnes (mt) of wheat across 31.825 million hectares (mha), with an average national productivity of 3943 kg/ha and Gujarat produced 3.646 metric tonnes (mt) of wheat across 1.149 million hectares (mha) with an average productivity of 3172 kg/ha (Anon., 2022). The wheat crop is mostly damaged by

fungal disease which include black stem rust (*Puccinia graminis tritici* (Pers.) Eriks and Henn.), leaf rust (*Puccinia striiformis* West), loose smut (*Ustilago tritici* (Jens) Scharf), karnal bunt (*Neovossia indica* Mundkur), foliar blight (*Bipolaris sorokiniana*) and powdery mildew (Van Ginkel and Rajaram, 1998). Among them foliar blight has suddenly become a serious global concern (Dubin and Ginkel, 1991). Wheat foliar blight was first identified in India (Kulkarni, 1924). In India, foliar blight of wheat is considered as one complex, which includes leaf blight caused by *Alternaria trititica* and spot blotch caused by *Bipolaris sorokiniana* (Sacc.) Shoemaker (Syn. *Helminthosporium sativum*). Our country experiences yield losses ranging from 2.72 to 36.24 per cent across various agro-climatic zones (Parashar *et al.*, 1995). Therefore, farmers need real-time information to make effective management decisions. This study aimed to identify suitable fungicides and determine the most

Table 1: Fungicides used in management of foliar blight of wheat *in vivo*.

Sr.	Treatments	C
1	Copper oxychloride 50% WP	0.2
2	Mancozeb 75% WP	0.2
3	Propineb 70% WP	0.1
4	Tebuconazole 25.9 EC	0.01
5	Propiconazole 25% EC	0.01
6	Picoxystrobin 22.52% SC	0.05
7	Captan 70% + hexaconazole 5% WP	0.05
8	Tebuconazole 50 % + trifloxystrobin 25 % WG	0.05
9	Hexaconazole 4% + zineb 68 % WP	0.05
10	Control	-
C: Concentration (%)		

effective application practices to ensure maximum benefits for farmers.

Material and Methods

The experiment was conducted in year 2024-25 during *Rabi* season at Research Farm, Wheat Research Station, Junagadh Agriculture University under natural field condition. The variety HD 2932 which was susceptible to spot blotch of wheat used for study. Ten treatments of fungicides with one check were laid out in randomized block design (RBD) with three replications (Table 1). The plot size was maintained at 2.5 × 2.025 sq. m. and recommended agronomic practices were followed to raise the crop. The inoculum load of seven days old culture of *Bipolaris sorokiniana* prepared on half cooked sorghum grains were artificially inoculated on plants. After sowing for artificial inoculation of pathogen spore suspension was prepared in sterilized distilled water with added few drops of tween 20 to make uniform suspension and the concentration was adjusted 1×10^6 conidia/ml. Field inoculation was done in afternoon to facilitate infection under humid condition during night hours. Artificial conidial suspension spray was carried out on 23rd December, 2024 (Plate 1).



Plate 1: Field inoculation of *Bipolaris sorokiniana* spore suspension

Application of treatment

Two sprays of fungicides were carried out on wheat, first at the time of initiation of disease and second fifteen days after first spraying.

Five plants from each of the plot were selected for recording observation on foliar blight. From each plant F1 and F-1 leaves were observed for foliar blight. Spraying of fungicides was carried out on 13th January, 2025 and subsequent spray was carried out on 28th January, 2025. Observation on per cent disease intensity (PDI) was recorded at 7th February, 2025. The disease rating was done by using 0-9 scale and then these grades was converted into per cent disease intensity (PDI) by using the formula given below (Wheeler, 1969).

$$PDI = \frac{\text{Sum of individual rating}}{\text{Number of plant observed} \times \text{Maximum disease rating}} \times 100$$

The per cent disease control was calculated with the help of following formula (Singh *et al.*, 2016).

$$\text{Disease control (\%)} = \frac{\text{P.D.I. in control plot} - \text{P.D.I. in treated plot}}{\text{P.D.I. in control plot}} \times 100$$

Loss was estimated on the basis of yield obtained in different treatments in terms of percentage according to formula given below

$$\text{Yield loss} = \frac{\text{Yield in treatment} - \text{Yield in control}}{\text{Yield in control}} \times 100$$

Results and Discussion

The results of the study clearly demonstrated that all the fungicidal treatments significantly reduced disease intensity when compared to the untreated control. The data presented in Table 2, Fig. 1 and 2 revealed that all the treatments were the disease intensity with corresponding increase in yield as compared to the control effective in reducing under field condition (Plate 2).

Among different treatments, tebuconazole 50 + trifloxystrobin 25 WG was significantly superior over the rest of the treatments and showed minimum disease



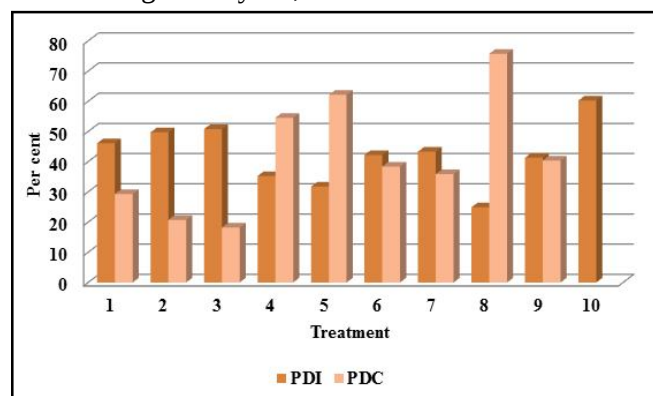
Plate 2: Field evaluation of different fungicides against foliar blight of wheat caused by *Bipolaris orokiniana*.

Table 2: Per cent disease intensity (PDI) and seed yield of wheat foliar blight as influenced by different fungicides.

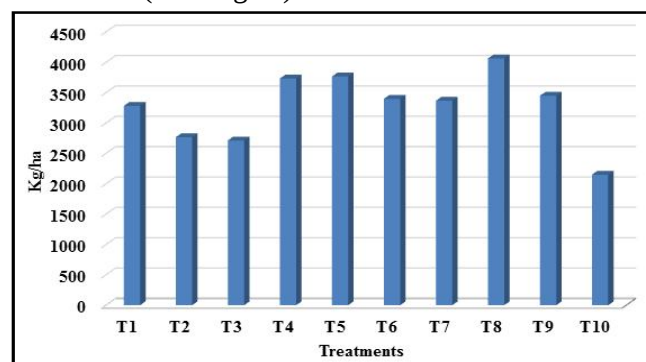
Tr.No.	Treatments	C	PDI	PDC	SY	SYIOC
T ₁	Copper oxy chloride 50 WP	0.2	46.09(51.90)	29.29	3283	52.71
T ₂	Mancozeb 75 WP	0.2	49.71(58.19)	20.70	2767	28.68
T ₃	Propineb 70 WP	0.1	50.79(60.04)	18.18	2713	26.20
T ₄	Tebuconazole 25.9 EC	0.01	35.25(33.31)	54.54	3733	73.64
T ₅	Propiconazole 25 EC	0.01	31.77(27.72)	62.12	3767	75.19
T ₆	Picoxystrobin 22.52 SC	0.05	42.23(45.17)	38.38	3400	58.14
T ₇	Captan 70 + Hexaconazole 5 WP	0.05	43.31(47.05)	35.85	3367	56.59
T ₈	Tebuconazole 50 + Trifloxystrobin 25 WG	0.05	24.88(17.71)	75.75	4063	88.99
T ₉	Hexaconazole 4 + Zineb 68 WP	0.05	41.30(43.56)	40.40	3450	60.47
T ₁₀	Control	-	60.24(75.37)	0	2150	0
S.E.m ±			3.00			201.19
C.D. at 5%			8.91			597.71
C.V.%			12.21			10.66
C: Concentration (%); PDI: Per cent disease intensity; PDC: Per cent disease control; SY: Seed yield (kg/ha); SYIOC: Seed yield increase over control						
Note: Data outside the parentheses are arcsine transformed, whereas inside are retransformed values.						

intensity (17.71%) at 0.05 % concentration with 75.75 per cent disease control. The next effective treatment was propiconazole 25 EC (27.72 %) found statistically at par with tebuconazole 25.9 EC (33.31 %) at 0.01 % concentration with corresponding disease control of 62.12 and 54.54 per cent, respectively. Hexaconazole 4 + zineb 68 WP (43.56%) with 40.40 per cent disease control found statistically at par with picoxystrobin 22.52 SC (45.17 %) and captan 70 + hexaconazole 5 WP at 0.05 % concentration with disease control 38.38 and 35.85 per cent, respectively. Whereas, copper oxychloride 50 WP (51.90 %) with 29.29 per cent disease control found statistically at par with mancozeb 75 WP (58.19 %) with 20.70 per cent disease control at 0.2 % concentration and in addition to propineb 70 WP (60.04 %) with 18.18 per cent disease control at 0.1 per cent concentration. While, maximum disease intensity was found in the control (75.37%).

Looking to the yield, the treatment tebuconazole 50

**Fig. 1:** Per cent disease intensity and per cent disease control of foliar blight of wheat as influenced by different fungicides under *in vivo* condition.

+ trifloxystrobin 25 WG at 0.05 per cent gave maximum seed yield (4063 kg/ha) with 88.99 per cent yield increased over control, but it was remained statistically at par with propiconazole 25 EC at 0.01 per cent (3767 kg/ha), tebuconazole 25.9 EC at 0.01 per cent (3733 kg/ha) with 75.19 and 73.64 per cent yield increase over control, respectively. The next effective treatment was hexaconazole 4 + zineb 68 WP (3450 kg /ha) with 60.47 per cent yield increase over control followed by picoxystrobin 22.52 SC (3400 kg/ha) with 58.14 per cent disease control and captan 70 + hexaconazole 5 WP (3367 kg/ha) with 60.47 yield increase over control all three at 0.05 per cent concentration. Whereas, copper oxy chloride 50 WP at 0.2 per cent concentration with 3283 kg/ha seed yield and with 52.71 per cent yield increase over control, mancozeb 75 WP (2767 kg/ha) with 28.68 per cent yield increase over control at 0.2 per cent concentration. Propineb 70 WP (2713 kg/ha) with 26.20 per cent yield increase over control at 0.1 per cent concentration. While, minimum seed yield was found in the control (2150 kg/ha).

**Fig. 2:** Seed yield of foliar blight infected wheat as influenced by different fungicides *in vivo* Condition.

The present result corroborate the finding of Kumar *et al.*, (2019). They reported minimum disease severity of 60.33 per cent in the treatment of trifloxystrobin + tebuconazole 080 FS against foliar blight causing pathogen under field condition.

Conclusion

Based on current study, it can be concluded that tebuconazole 50 + trifloxystrobin 25 WG was significantly superior over the rest of the treatments and showed minimum disease intensity (17.71%) at 0.05 per cent concentration with 75.75 per cent disease control. The next effective treatment was propiconazole 25 EC (27.72 %) found statistically at par with tebuconazole 2.9 EC (33.31%) at 0.01 per cent concentration with corresponding disease control of 62.12 and 54.54 per cent, respectively. These treatments help in managing the wilt disease incidence of foliar blight of wheat caused by *Bipolaris sorokiniana* with corresponding increase in seed yield as compared to other treatments under field evaluation.

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