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Efficacy of fungicides for the management of Karnal bunt of wheat

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Abstract

Five fungicides namely corboxin (Vitavax 75WP), Carbendazim (Bavistin 50WP), Subeej (Bavistin 25SD), Propiconazole (Tilt 20EC), Vitavax power (Cromp. Uni. Royal) alongwith one untreated control. All these five fungicides were tested at three concentrations i.e. 0.1%, 1.0% and 2.5%. The radial growth was measured after 15 days and per cent inhibition radial growth was calculated and propiconazole (Tilt 20EC) was found most inhibitory against the radial growth.

Keywords: karnal bunt, *Neovossia indica*

Introduction

In India, Karnal bunt is particularly prevalent in the *tarai* and high fertility irrigated areas of north west plains. However, parts of Madhya Pradesh, Southern Rajasthan, Maharashtra & penninsular India are free from Karnal bunt as the temperature are higher in the areas. Incidence of Karnal bunt is erratic in eastern India and seldom exceeds traces to very low level of infections. Karnal bunt is a disease of wheat, durum, rye and triticale (hybrid wheat and rye). Though the disease native to South Asia but subsequently it has been reported from Iran, Syria, Afganistan, Iraq, Mexico, Nepal and United States. The disease remained less damaging till 1970s but subsequently severe epidemic started occurring coinciding with the change over to high yielding irrigated, semi-dwarf and high fertilizer input farming. Although many control strategies have been suggested for the management of Karnal bunt disease and the strategies include seed treatment with hot water and solar energy, seed treatment with fungicides and soil drenching with fungicides ^[1], however, the results are not convincing. An integrated disease management (IDM) system, combining host resistance, regulatory measures, cultural practices, biosuppression techniques and chemical measures as its sub-systems to manage wheat disease. The foliar at 0.20% contaf at 0.10%, Tilt at 0.10% resulted in more than 90% Karnal bunt control as happened during present investigation also ^[4]. Likewise, similar studies and compared the efficacy of Propiconazole, hexaconazole and some botanicals ^[5]. Among the large number of fungicides screened as foliar sprays, triazole compounds namely, Tilt (Propiconazole), Folicur (Tebuconazole) and Confof (hexaconazole) have been found quite effective ^[2]. Folicur, Tilt and Score 10 (Prifenoconazole) have been reported to inhibit sporidial production under in vitro conditions ^[3].

A range of fungicides (Mancozeb, Carbendazim, Fentin hydroxide, Bitertanol & Propiconazole) have been reported giving effective control of the doses of applied at the seedling stage. Single spray of Propiconazole (Tilt EC @0.1%) has been recommended by various workers for the management of disease for seed production purposes ^[6].

Material and Method**Efficacy of fungicides against *Neovossia indica* (In vitro)**

Corboxin (Vitavax 25 WP), Carbendazim (Bavistin 50 WP), Carbendazim-Subeej (Bavistin 25 SD), Propiconazole 20 EC (Tilt 20 EC) and Vitavax power (Cromp. Uni. Royal) @ different concentration i.e. 0.1, 1.0 and 2.5 per cent were tested against radial growth and secondary sporidia production. The required amount of the fungicides were incorporated into Glucose yeast extract medium and mixed thoroughly before autoclaving. After autoclaving the medium was powered aseptically in sterilize Petri plates. After cooling the plates were inoculated with 5 mm mycelial disc from 15 days old culture of the fungus. The inoculated plates were incubated at 20±2°C for 15 days and each treatment was replicated thrice. The colony diameter was measured with the help of scale. The data thus obtained was statistically analysed after the conversion of percentage value into the corresponding angular transformed values.

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Table 1: List of fungicides tested against *N. indica* (*In-vitro*).

Fungicides	Concentration (%)		
	0.1	1.0	2.5
T ₁ - Carboxin (Vitavax 75 WP)	0.1	1.0	2.5
T ₂ - Carbendazim (Bavistin 50 WP)	0.1	1.0	2.5
T ₃ - Carbendazim-Subeej (Bavistin 25SD)	0.1	1.0	2.5
T ₄ - Propiconazole 20 EC (Tilt 20EC)	0.1	1.0	2.5
T ₅ - Vitavax Power (Crop Uni Royal)	0.1	1.0	2.5
Control	0.1	1.0	2.5

Result

Efficacy of fungicides against *N. indica* (*In vitro*)

Five fungicides namely carboxin (Vitavax 75WP), Carbendazim (Bavistin 50WP), Subeej (Bavistin 25 SD) Propiconazole (Tilt 20 EC), Vitavax power (Cromp. Uni. Royal) alongwith one untreated control was taken into consideration for the study. All these five fungicides were tested at three concentrations i.e. 0.1, 1.0 and 2.5 per cent. The radial growth was measured after 15 days and per cent inhibition to the radial growth was calculated.

In check (control) which consisted the medium without mixing any fungicides, measured the maximum growth (39mm) which was compared with other fungicides and their variable concentration and ultimately the per cent inhibition was worked out. All the treatment varied invariably for their efficacy. At 1 per cent maximum inhibition 19.30 per cent was recorded in T₄ followed by T₂ (17.17%), while the minimum inhibition (17.09%) was recorded in T₃ which was Subeej (Bavistin 25 SD) meant for seed treatment purposes having 25% Carbendazim with dye (Table-2).

Table 2: Efficacy of fungicides *N. indica* (Per cent inhibition to radial growth)

Fungicides	Per cent Inhibition to radial growth		
	Concentration (% a.i.)		
	0.1%	1.0%	2.5%
T ₁ - Carboxin (Vitavax 75 WP)	15.10 (22.87)**	24.23 (29.49)	31.67 (34.24)
T ₂ - Carbendazim (Bavistin 50 WP)	17.17 (24.48)	26.27 (30.83)	33.11 (35.07)
T ₃ - Carbendazim-Subeej (Bavistin 25 SD)	12.09 (20.34)	21.33 (27.37)	28.38 (32.19)
T ₄ - Propiconazole 20 EC (Tilt 20EC)	19.30 (26.06)	27.72 (31.77)	38.23 (38.19)
T ₅ - Vitavax Power (Crop Uni Royal)	14.20 (22.14)	23.85 (29.24)	32.53 (34.78)
Control	*		

Factors CD at 5%

Fungicides (F) 0.957

Concentration (C) 0.256

F x C 0.572

* Radial growth in check 39.00 mm. check consisted of the medium without fungicides.

** Values given in parenthesis are angular transformed values.

Similarly, at 1% level of concentration also the maximum inhibition (27.72%) recorded in T₄, closely followed by T₂ (26.27%) and the difference between the T₄ and T₂ varied significantly. The minimum inhibition was (21.33%) recorded in T₃ as was in case of 1% level of concentration.

Likewise at 2.5% concentration also the maximum inhibition (38.23%) was recorded in T₄ followed by T₅ (35.53%) and T₁ (31.67%). However, the differences between T₁ and T₅ was found non-significant or we can say efficacy wise T₁ as well as T₅ remained significantly at par. Here also the minimum inhibition was recorded through T₅. The data indicated the longer persistency of T₅ over T₁.

Conclusion

The maximum inhibition (38.23 per cent) irrespective of the concentration was recorded in case of Propiconazole 20 EC followed by Carbendazim 50 WP (33.11%) and Vitavax power (32.53%). Both the fungicides which exhibited their superiority in reducing the radial growth are recommended for the foliar sprays for the management of Karnal bunt of wheat. Off course, the single foliar spray of Propiconazole 20 EC @ 500 ml/ha⁻¹ at boot leaf stage is suggested by various workers for good seed lusture, yield and Karnal bunt free seed production of wheat. The inhibition to radial growth is a indicator for the superiority of a particular fungicide. Accordingly, Propiconazole 20EC at all the three concentration levels tested remained superior over other fungicides which may be recommended for its use under field condition, specially for Karnal bunt free quality seed production and export purposes.

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