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Evaluation of ready mix fungicides against *Colletotrichum truncatum* causing anthracnose of black gram

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Abstract
Anthracnose is one of the major seed and soil borne disease affecting blackgram production. The present study conducted to evaluate the efficacy of six ready mix combi product fungicides *viz.*, metiram 55% + pyraclostrobin 5% WG, carbendazim 12% + mancozeb 63% WP, tebuconazole 50% + trifloxystrobin 25% WG, kresoxim-Methyl 18% + chlorothalonil 56% WG, azoxystrobin 18.2% + difenoconazole 11.4% SC, hexaconazole 5% + captan 70% WP against *Colletotrichum truncatum* causing anthracnose disease in black gram under *in-vitro* condition. All the ready mix fungicides were found promising in inhibiting vegetative growth of pathogen. Among six combi products evaluated, saaf (carbendazim 12% + mancozeb 63% WP) was most effective at all the three concentrations (500, 1000, 1500 ppm) tested. Tebuconazole 50% + Trifloxystrobin 25% WG was found next best fungicide to inhibit the pathogen growth while hexaconazole 5% + captan 70% WP was least effective in inhibiting the pathogen growth at all concentrations.

Keywords: Black gram, *Colletotrichum*, anthracnose, fungicides

1. Introduction
Urdbean is an important pulse crop having high nutritional value. India accounts for more than 70 percent of global output, followed by Myanmar and Pakistan. The production of urdbean in India stands for 22.76 lakh tonnes from an area of 38.48 lakh ha (Anonymous., 2021) [3]. In Gujarat, black gram is cultivated over 18.00 thousand hectares with the production of 13.00 thousand tonnes.

Black gram is usually cultivated in *kharif* season and its productivity is mainly affected by insect pests and diseases. Among foliar diseases, powdery mildew (*Erysiphe polygoni*), leaf spots (*Cercospora* sp. *Alternaria* sp.), anthracnose (*Colletotrichum* spp.) mosaic and leaf crinkle are the major ones affecting black gram (Agarwal, 1991) [1]. *Colletotrichum* spp. causes anthracnose of black gram, is an important seed and soil-borne disease (Agarwal, 1991) [1]. The occurrence of anthracnose disease in black gram is commonly observed in most of the cultivated areas. Anthracnose disease is a major obstacle in black gram cultivation. Anthracnose pathogen (*Colletotrichum* spp.) attacks all aerial parts of plants at all stages of development leading upto 67 percent yield losses (Deeksha and Tripathi, 2002) [5].

Various approaches have been explored to manage the anthracnose disease, however foliar spray with fungicides appears to be more effective. Though some fungicides are effective, in recent years availability of new molecules, combi products has necessitated for testing *in-vitro* before they are taken to field level. With this objective the experiment was taken to check the efficacy of ready mix combi products against anthracnose pathogen under *in-vitro* conditions.

2. Materials and Methods
2.1 Isolation of anthracnose pathogen
The infected leaf exhibiting typical symptoms of anthracnose cut into small bits and surface sterilized for 30 seconds in 1 percent sodium hypochlorite solution and washed thoroughly in sterile distilled water for thrice. Blot dried pieces were aseptically transferred to Potato Dextrose Agar (PDA) plates and incubated at 28±1 °C for growth. The culture, thus obtained was purified by single spore isolation method.

2.2 *In-vitro* evaluation of fungicides against *C. truncatum*
The efficacy of fungicides *viz.*, metiram 55% + pyraclostrobin 5% WG, carbendazim 12% +

mancozeb 63% WP, azoxystrobin 18.2% + difenoconazole 11.4% SC, kresoxim-Methyl 18% + chlorothalonil 56% WG, tebuconazole 50% + trifloxystrobin 25% WG and hexaconazole 5% + captan 70% WP (Table 1) were assayed at 500, 1000 and 1500ppm by following poisoned food technique against *C. truncatum* causing anthracnose in black gram (Nene and Thapliyal, 1993) [8].

The fungicides were incorporated into sterilized, cooled potato dextrose agar to get required concentrations. The poisoned PDA medium was poured into sterilized Petri plates and five mm mycelial disc of pathogen was placed in the centre of Petri plate separately. Three repetitions were maintained for each treatment. The control plates were maintained by pouring only PDA medium without fungicides. Both Treatment and control plates were placed in incubator at 28±1 °C. The diameter of the colony was recorded and percent inhibition was calculated by using the formula (Vincent, 1947) [11] as indicated below.

$$I = \frac{C-T}{C} \times 100$$

Where,
I = Percent inhibition of mycelial growth
C = Growth of pathogen in control plate (mm)
T = Growth of pathogen in treatment plate (mm)

Table 1: List of ready mix fungicides used

Sr. No.	Common name	Trade name
1.	Carbendazim 12% + Mancozeb 63% WP	SAAF
2.	Azoxystrobin 18.2% + Difenoconazole 11.4% SC	Amistar top
3.	Tebuconazole 50% + Trifloxystrobin 25% WG	Nativo
4.	Metiram 55% + Pyraclostrobin 5% WG	Carbiotop
5.	Kresoxim-methyl 15% + Chlorothalonil 56% WG	Sarthak
6.	Hexaconazole 5% + Captan 70% WP	Taquat

2.3 Statistical Analysis
The observations recorded in the experiment were analyzed by using M-STATC programme.

3. Results and Discussion
All the tested combi products were effective in inhibiting the *C. truncatum* at all the tested concentration (500, 1000 and 1500 ppm) (Table 1, Plate 1, Fig.1). At 500 ppm concentration, SAAF (Carbendazim 12% + mancozeb 63% WP) completely inhibited the mycelial growth of pathogen and next best treatment was kresoxim-methyl 15% + chlorothalonil 56% WG which showed only 8.66mm mycelial growth with 90.37% inhibition. Least inhibition (47.96%) was observed in hexaconazole 5% + captan 70% WP.

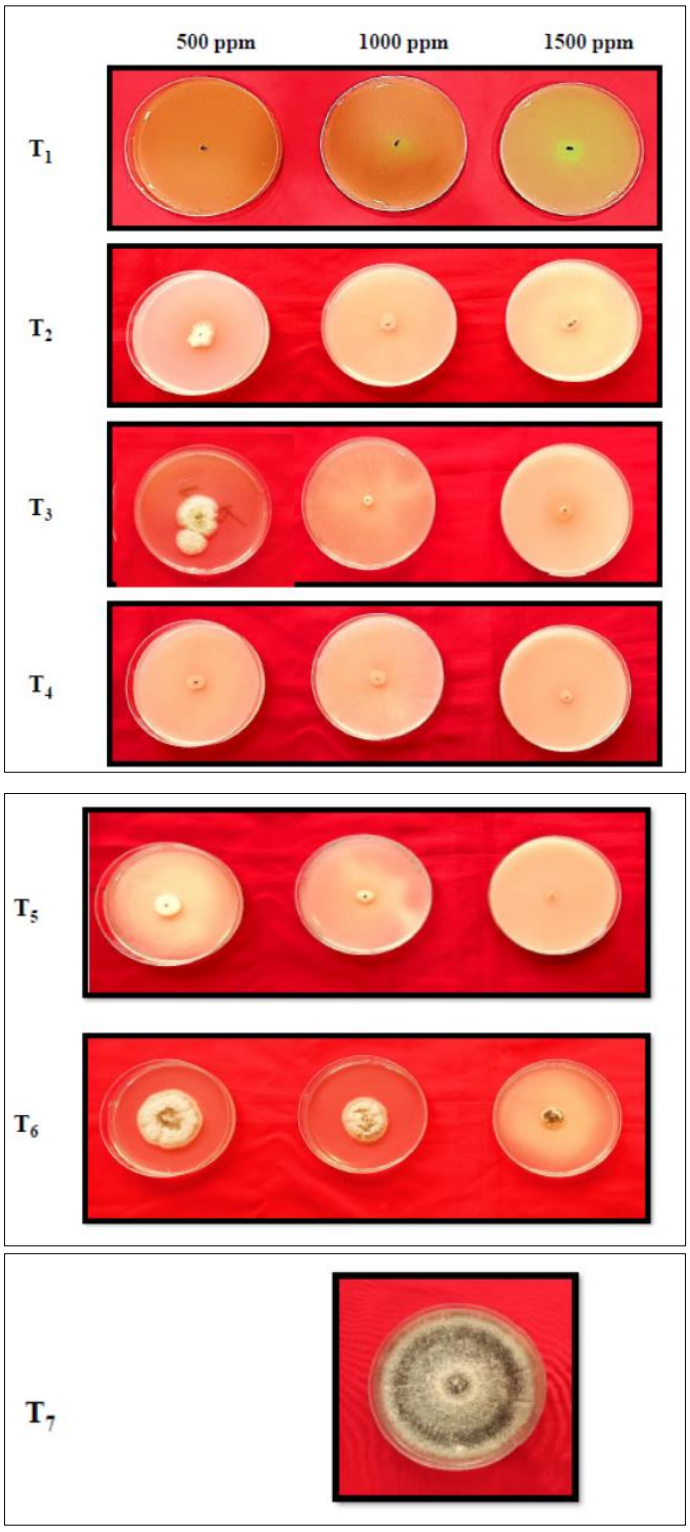
At 1000 ppm concentration carbendazim 12% + mancozeb 63% WP was most effective which showed complete pathogen inhibition followed by tebuconazole 50% + trifloxystrobin 25% WG (95.77%). The least mycelial growth inhibition was observed in hexaconazole 5% + captan 70% WP (67.11%). At 1500 ppm concentration, carbendazim 12% + mancozeb 63% WP was most effective and hexaconazole 5% + captan 70% WP was least effective in mycelial growth inhibition (86.15%) (Table 1).

The present result on efficacy of combi product fungicides on anthracnose pathogen were reported by Poonacha *et al.* (2020) [9], Shashikumara *et al.* (2020) [10], Jayalakshmi *et al.* (2018) [6], Chaudhari and Gohel (2016) [4] and Aggarawal *et al.* (2015) [2]. Jyotika *et al.* (2023) [7] reported complete inhibition of anthracnose pathogen by Carbendazim 12% + Mancozeb 63% WP at 1000, 2000 and 3000 ppm. Similar findings were also Aggarawal *et al.*, (2015) [2] reported the effectiveness of carbendazim 12% + mancozeb 63% WP against *C. lindemuthianum* causing anthracnose of blackgram.

Table 2: *In-vitro* evaluation of ready mix fungicides against *C. truncatum* causing anthracnose of black gram

Tr. No	Treatment	Conc. (ppm)	Mycelial Growth* (mm)	Growth inhibition (%)	Conc. (ppm)	Mycelial growth (mm)	Growth inhibition (%)	Conc. (ppm)	Mycelial growth (mm)	Growth inhibition (%)
T_1	Carbendazim 12% + Mancozeb 63% WP	500	0.00	100.00	1000	0.00	100.00	1500	0.00	100.00
T_2	Azoxystrobin 18.2% + Difenoconazole 11.4% SC	500	15.50	82.77	1000	8.20	90.88	1500	9.30	89.66
T_3	Tebuconazole 50% + Trifloxystrobin 25% WG	500	22.96	74.48	1000	3.80	95.77	1500	2.33	97.41
T_4	Metiram 55% + Pyraclostrobin 5% WG	500	12.00	86.66	1000	8.36	90.71	1500	3.46	96.15
T_5	Kresoxim-methyl 15% + Chlorothalonil 56% WG	500	8.66	90.37	1000	9.43	89.52	1500	4.96	94.48
T_6	Hexaconazole 5% + Captan 70% WP	500	46.83	47.96	1000	29.60	67.11	1500	12.46	86.15
T_7	Control	-	90.00	-	-	90.00	-	-	90.00	-
	S. Em. ±	-	0.20	-	-	0.18	-	-	0.10	-
	C.D. at 5%	-	0.92	-	-	0.85	-	-	0.49	-

* Mean of three replications



T1: Carbendazim 12% + mancozeb 63% WP
T2: Azoxystrobin 18.2% + difenoconazole 11.4% SC
T3: Tebuconazole 50% + trifloxystrobin 25% WG
T4: Metiram 55% + pyraclostrobin 5% WG
T5: Kresoxim-methyl 15% + chlorothalonil 56% WG
T6: Hexaconazole 5% + captan 70% WP
T7: Control

Plate 1: Efficacy of combi product fungicides against *C. truncatum*

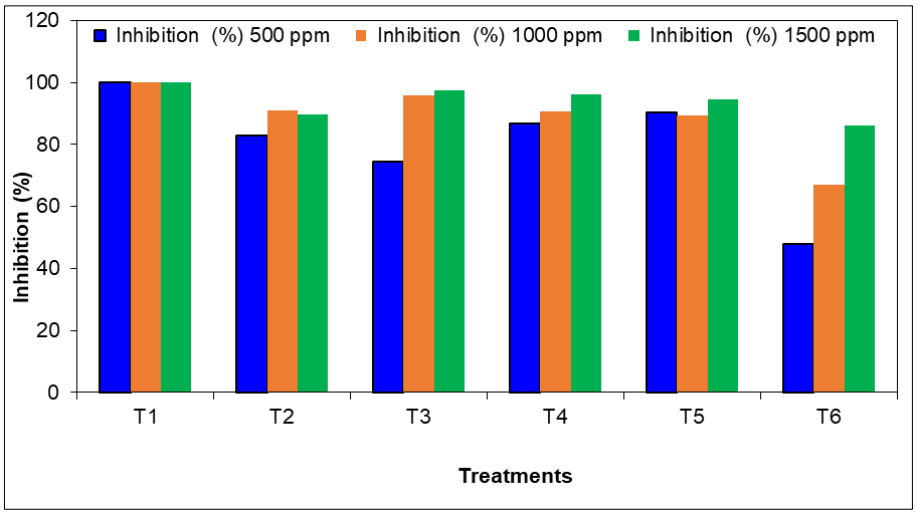


Fig 1: *In vitro* efficacy of ready mix fungicides against *Colletotrichum truncatum*

Conclusion

The present study on efficacy of various comibi product fungicides against *C. truncatum* showed that Carbendazim 12% + Mancozeb 63% WP was more promising with complete inhibition of pathogen at all the concentrations tested (500, 1000 and 1500 ppm).

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References

1. Agarwal SC. Diseases of Green gram and Black gram, International Book Distributors, Dehradun; c1991. p. 321.
2. Aggarwal SK, Mali BL, Rawal P. Management of anthracnose in black gram caused by *Colletotrichum lindemuthianum*. Journal of Mycology and Plant Pathology. 2015;45(3):263-266.
3. Anonymous. Annual Report Department of Agriculture and Farmers welfare, GOI; c2021. p. 1-263.
4. Chaudhari KA. Gohel NM. Management of Anthracnose Disease of Mungbean through New Fungicidal Formulations. Journal of Pure and Applied Microbiology. 2016;10(01):691-696.
5. Deeksha J, Tripathi HS. Cultural, biological and chemical control of anthracnose of urdbean. Journal of Mycology and Plant Pathology. 2002;32(1):52-55.
6. Jayalakshmi K, Nargund VB, Raju J, Benagi VI. Effect of fungicides and botanicals against *Colletotrichum gloeosporioides* causing anthracnose of pomegranate. Bioinfolet. 2018;10(2A):502-506.
7. Jyotika RK, Dadke MS, Apet KT, Lokhande AD. Evaluation of systemic, non-systemic and combi-product fungicides against *Colletotrichum lindemuthianum* causing French Bean anthracnose. The Pharma Innovation Journal. 2023;12(6):2421-2425.
8. Nene YL, Thapliyal PN. Evaluation of fungicides in plant disease control (3rd ed.). New Delhi: Oxford, IBH Publishing Company; c1993.
9. Poonacha TT, Hedge YR, Hedge GM. Efficacy of fungicides against *Colletotrichum lindemuthianum* (Sacc. & Magn.) Bri. & Cav. causing anthracnose of French bean. International Journal Current Microbiology and Applied Science. 2020;9(12):78-84.
10. Shashikumara B, Rajeswari B, Devi GU, Sridevi G, Konda S. *In vitro* evaluation of fungicides, botanicals and bioagents against *Colletotrichum lindemuthianum*. International Journal of Current Microbiology and Applied Science. 2020;9(07):551-556.
11. Vincent JM. Distortion of fungal sac hyphae in the presence of certain Inhibitors, Nature; c1927. p. 159-850.