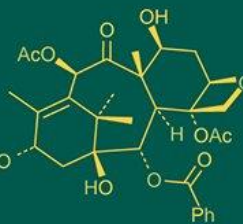
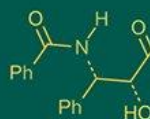


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; 10(5): 544-548
www.biochemjournal.com
Received: 13-02-2026
Accepted: 16-03-2026

Pragya Bauddha
Department of Plant
Pathology, Tilak Dhari Post
Graduate College, Jaunpur,
Uttar Pradesh, India

Ramesh Singh
Department of Plant
Pathology, Tilak Dhari Post
Graduate College, Jaunpur,
Uttar Pradesh, India

Chandra Mani Patel
Department of Plant
Pathology, Tilak Dhari Post
Graduate College, Jaunpur,
Uttar Pradesh, India

Shubham Singh
Department of Plant
Pathology, Tilak Dhari Post
Graduate College, Jaunpur,
Uttar Pradesh, India

Gaurav
Department of Plant
Pathology, Tilak Dhari Post
Graduate College, Jaunpur,
Uttar Pradesh, India

Corresponding Author:
Pragya Bauddha
Department of Plant
Pathology, Tilak Dhari Post
Graduate College, Jaunpur,
Uttar Pradesh, India

Effect of different fungicides against *Rhizoctonia bataticola* causing dry root rot of chickpea in *in-vitro* and *in-vivo* condition

Pragya Bauddha, Ramesh Singh, Chandra Mani Patel, Shubham Singh and Gaurav

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i5g.8453>

Abstract

Chickpea (*Cicer arietinum* L.) is a widely cultivated leguminous crop that holds significant agronomical, nutritional and economic worldwide. Among the fungal disease Dry root rot caused by *Rhizoctonia bataticola* is most destructive disease. The efficacy of six fungicide tested by Food Poison Technique against the pathogen under *In-vitro* and *In-vivo* condition. The Carbendazim was most effective fungicide *In-vitro* condition which showed (00.00 mm) fungal growth and 100% Inhibition over control. Mancozeb 75% WP was least effective fungicide which showed 87.32 mm fungal growth and 0.77% inhibition over control. The most effective fungicide tested *In-vitro* conditions were applied in field condition 2024-25 and 2025-26 in *Rabi* season. In the year 2024-2025, spraying of fungicide Carbendazim 50% WP 0.2% interval of 20 days was found most effective in minimum the disease incidence 20.40% and increasing yield 11.6 q/h. The least effective fungicide was Hexaconazole 5% SC which showed the maximum disease incidence 49.62 and minimum yield 5.60. In the year 2025-2026, spraying of fungicide Carbendazim 50% WP 0.2% interval of 20 days was found most effective in minimum the disease incidence 22.06% and increasing yield 12.20 q/h. The least effective fungicide was Hexaconazole 5% SC which showed the maximum disease incidence 52.01 and minimum yield 6.20.

Keywords: Chickpea, *Cicer arietinum* L., dry root rot, *Rhizoctonia bataticola*, fungicides, *in-vitro* and *in-vivo*

Introduction

Chickpea (*Cicer arietinum* L.) is a widely cultivated leguminous crop that holds significant agronomical, nutritional and economic worldwide. It is the second most important grain legume after common beans in terms of global production and consumption. In Tropical regions, chickpea is usually cultivated in winter, relying on residual soil moisture after the rainy season, while in temperate and Mediterranean climates, it is grown in spring. Nutritionally, it contains around 21.1% protein, 61.5% carbohydrates, 4.5% fat, 6% crude fibre and 6% soluble sugar. Chickpea ranks third among the food legumes after beans and pea. Chickpea is grown in over 50 countries of Asia, Africa, America and Oceania in rain-fed environments. Among Chickpea growing states of India viz., Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Andhra Pradesh, Karnataka, Chhattisgarh, Bihar and Jharkhand contributes more than 95 percent to the total production. India contributes to a major share of the World's chickpea area (70%) and production (67%) and to be the largest chickpea producing nation.

Methods and Materials

Screening of fungicide *In-vitro* condition

The six fungicides viz., Carbendazim 50% WP, Azoxystrobin 11% + Tebuconazole 18.3% SC, Chlorothalonil 75% WP, Metalaxyl-M-4% + Mancozeb 64% WP, Hexaconazole 5% SC and Mancozeb 75% WP, were tested for their efficacy *In-vitro* against *Rhizoctonia bataticola* causing dry root rot of chickpea by "Poisoned Food Technique". The experiment was conducted in the laboratory, Department of Plant Pathology, T.D.P.G. College, Jaunpur with CRD design with 7 treatment including control with 3 (three) replications.

The control Petri plates were allowed to grow in same condition on PDA medium without fungicides. Treated plates were incubated at room temperature (27±2 °C) for seven days. The observations on colony growth were recorded. The control plate was filled with at least 90 percent mycelia growth of the pathogen. The percent mycelial growth calculated as per Vincent's formula based on average colony diameter (Vincent, 1947) ^[4]

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

Where,

I = Percent growth inhibition.

C = Growth (mm) in control plate

T = Growth (mm) of the test fungus in treated plates.

$$\% \text{ disease control} = \frac{\text{Disease intensity in control} - \text{Disease intensity in treatment}}{\text{Disease intensity in control}} \times 100$$

Results and Discussion

Major symptoms of the dry root rot of chickpea

The main symptoms of the disease generally appear around seedling stage and yellowing of leaves, dropping of petioles and leaflets is confined to top of the plant. Sometimes when the rest of the plant is dry, the top most leaves are chlorotic. The tap root is dark, shows signs of rotting, and is devoid of most of its lateral and finer roots followed by drying of entire seedling (Fig-1). On the examination the tissues of roots were found blackened either uniformly or pounced discolorations (Nene *et al.* 1991) ^[6] the dried plants due to disease generally appeared during flowering and podding time. These were scattered in the field. The seedlings can also get infected. Drooping of petioles and leaflets was

Screening of fungicide *In-Vivo* condition

In order to find out a suitable fungicide was found effective *In-vitro* condition. The effective fungicides were assessed in field trial during *Rabi* season 2024-25 and 2025-26. The experiment was conducted at Student Research Farm Pilikothi Jaunpur. A highly susceptible field with known history of dry root rot was selected susceptible variety (JG-62) was sowing in 2X1 meter plot size. The plot is arranged with RBD design with three replication. Five fungicides Carbendazim 50% WP, Azoxystrobin11% + Tebuconazole 18.3% SC, Chlorothalonil 75% WP, Metalaxyl-M4% + Mancozeb 64% WP and Hexaconazole 5% SC were used. The fungicide was used as foliar spray from dry root rot infected field. For observed the disease incidence, thirty randomly selected plant/plot. The grain yield was recorded in kg/ha.

confined to those at top of the plant. Leaves and stem of affected plant usually turned straw coloured but in some cases, the lower portion of the stem was brown. When the plant was uprooted, lower portion of the tap root remained in the soil. The colony character of this pathogen was initial white but becomes grayish black to charcoal black with age (Fig.2). Lateral and finer roots dark minute sclerotial bodies can be seen on the roots exposed inside the wood (Fig-3). Mycelia width varied from approximately 2-11 µm and distance between two consecutive septa measured 46 µm (Fig.-4). However, the most important character regarding taxonomy and classification were the production size and composition of microsclerotia (Reichert and Hellinger, 1947) ^[7].

Table 1: Effect of different fungicides against *Rhizoctonia bataticola* causing dry root rot of chickpea in *In-vitro* condition

S. No.	Name of fungicide	Dose%	Avg. fungal growth (mm)	Inhibition over control (%)
1.	Carbendazim 50% WP	0.1	00.00	100.00
2	Azoxystrobin11% + Tebuconazole 18.3% SC	0.2	10.00	88.63
3	Chlorothalonil 75% WP	0.2	21.32	75.77
4	Hexaconazole 5% SC	0.2	26.66	69.70
5	Metalaxyl-M4% + Mancozeb 64% WP	0.1	75.32	14.40
6	Mancozeb 75% WP	0.2	87.32	0.77
7	Control		88.00	
	CD		3.52	

The result are presented in Table-1 (Fig.-5) and its corresponding histogram (Fig.-6) indicate all the fungicide were significantly superior over the control in inhibiting the growth of the pathogen *In-vitro* condition. Among the tested fungicide Carbendazim 50% WP was the most effective which showed (00.00 mm) fungal growth and 100.00% inhibition over control. Azoxystrobin11% + Tebuconazole18.3% SC and Chlorothalonil 75% WP was next best effective fungicide recording fungal growth (10.00 and 21.32 mm) and it's inhibiting the fungal growth (88.63 and 75.77%) These were statically different from each other. The next order of superiority the Hexaconazole 5% SC and

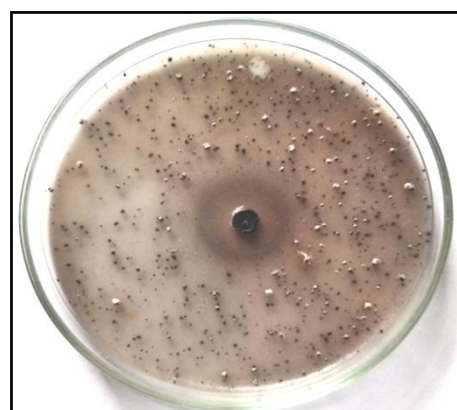
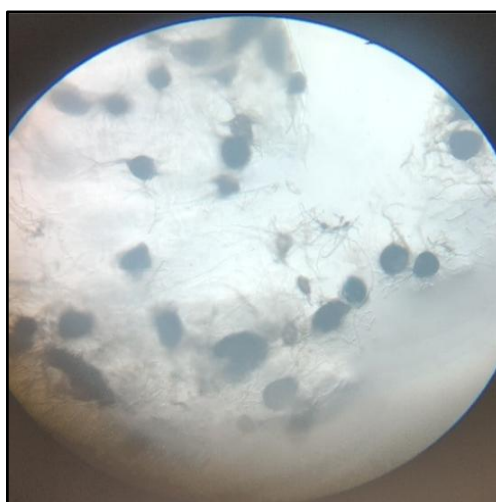
Metalaxyl-M 4% + Mancozeb 64% WP effective fungicide which showed (26.66 and 75.32 mm) growth and 69.70 and 14.40% inhibition over control. Mancozeb75% WP was least effective fungicide which showed Maximum 87.32 mm fungal growth and 0.77% inhibition over control. The results were more or less agreement with Lokesh *et al.* 2020 ^[1] reported that Carbendazim was highly effective against *Rhizoctonia bataticola* with 85% inhibition under *In-vitro* condition. Karkee *et al.* (2020) ^[5] reported the Tebuconazole + Trifloxystrobin and Carbendazim were best effective against *Rhizoctonia solani* under *In-vitro* condition.

Table 2: Effect of different fungicides against *Rhizoctonia bataticola* causing dry root rot of chickpea in *In-vivo* condition

S. N.	Fungicide	Dose%	% Disease incidence		Mean	Yield (q/ha.)		Mean
			2024-25	2025-26		2024-25	2025-26	
1.	Carbendazim 50% WP	0.2	20.40	22.06	21.23	11.06	12.20	11.63
2.	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.2	24.61	25.61	25.80	10.32	10.90	10.61
3.	Chlorothalonil 75% WP	0.2	29.09	31.74	30.41	8.40	9.10	8.75
4.	Metalaxyl-M 4% + Mancozeb 64% WP	0.2	38.76	40.92	39.84	7.28	7.80	7.54
5.	Hexaconazole 5% WP	0.2	49.62	52.01	50.81	5.60	6.20	5.9
7.	Control		51.44	53.98	52.71	4.97	5.74	5.355
	CD		3.50	3.55		3.54	3.57	

The results are presented in Table-2 and corresponding histogram (Fig.-7) of the field trial with 5 fungicides. They indicate their effectiveness in minimizing the disease. In the year 2024-2025, spraying of Carbendazim 50% WP 0.2% interval of 20 days was found most effective in minimizing the disease incidence 20.40% and increasing yield 11.06 q/h. The next order of effective fungicide was Azoxystrobin 11% + Tebuconazole 18.3% SC, Chlorothalonil 75% WP and Metalaxyl-M 4% + Mancozeb 64% WP which showed (24.61, 29.09 and 38.76%) disease incidence and corresponding yield (10.32, 8.40 and 7.26) respectively. These were statically different from each other. Hexaconazole 75% WP was the least effective fungicide, which showed the maximum disease incidence 49.62 and minimum yield 5.60. The findings are in close agreement with the observation of Meena *et al.* (2018) ^[2] against root rot of Mungbean caused by *Rhizoctonia solani*.

In the year 2025-2026 (Fig.-8), spraying Carbendazim 50% WP 0.2% fungicide at interval of 20 days was found most effective in minimizing the disease incidence 22.06% and its corresponding yield 12.20 q/h. The next effective fungicide was Azoxystrobin 11% + Tebuconazole 18.3% SC, Chlorothalonil 75% WP and Metalaxyl 4% + Mancozeb 64% WP which showed (25.61, 31.74 and 40.92%) disease incidence and its corresponding yield 10.90, 9.10 and 7.80. Hexaconazole 5% SC was the least effective fungicide, which showed the maximum disease incidence 52.01 and minimum yield 6.20. The findings are in close agreement with the observation of Veena and Reddy (2016) ^[3] against dry root of chickpea caused by *Rhizoctonia bataticola*.

**Fig 1:** Infected root of chickpea**Fig 2:** Culture of the pathogen**Fig 3:** Sclerotial bodies**Fig 4:** Mycelium of the pathogen

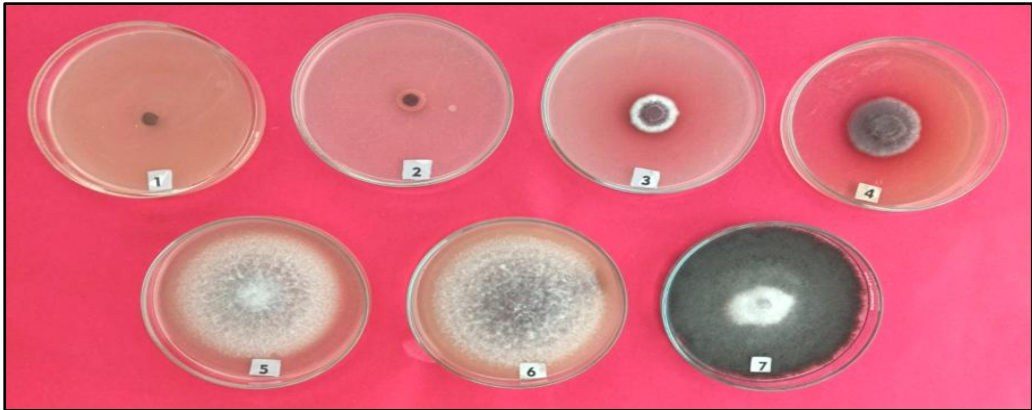


Fig 5: Different fungicides against dry root rot of chickpea under *In-vitro* condition

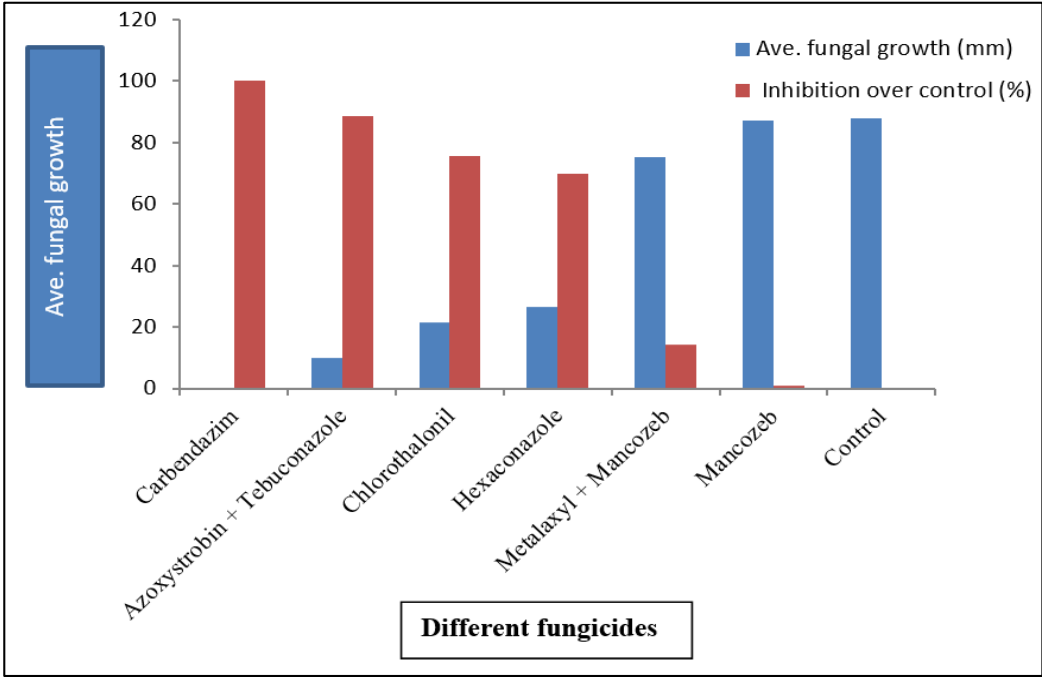


Fig 6: Effect of different fungicides against *Rhizoctonia bataticola* in *In-vitro* condition

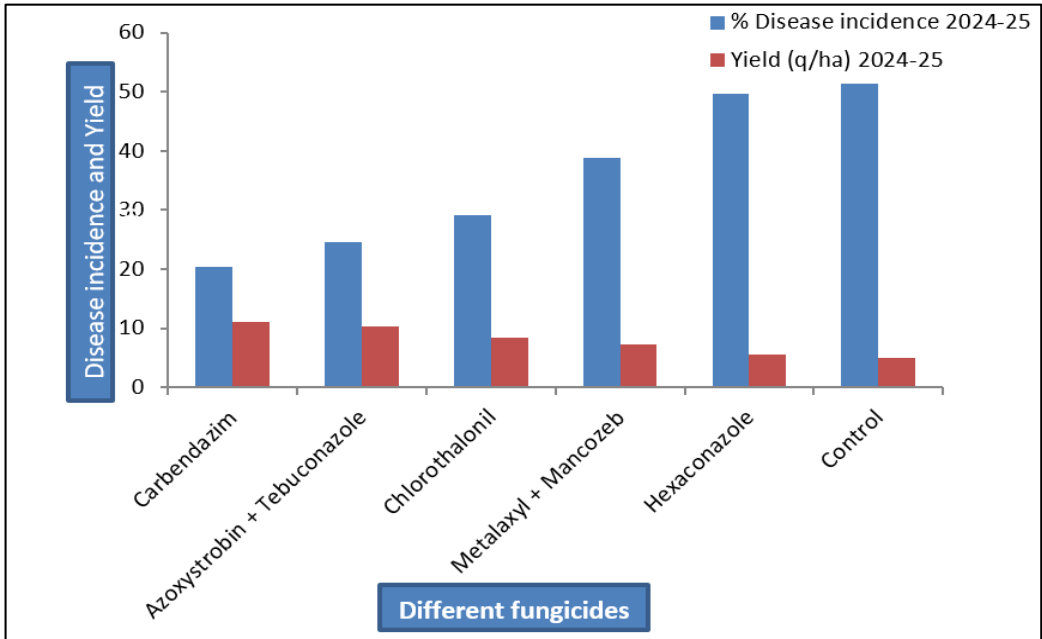


Fig 7: Effect of different fungicides against *Rhizoctonia bataticola* under in *In-vivo* condition

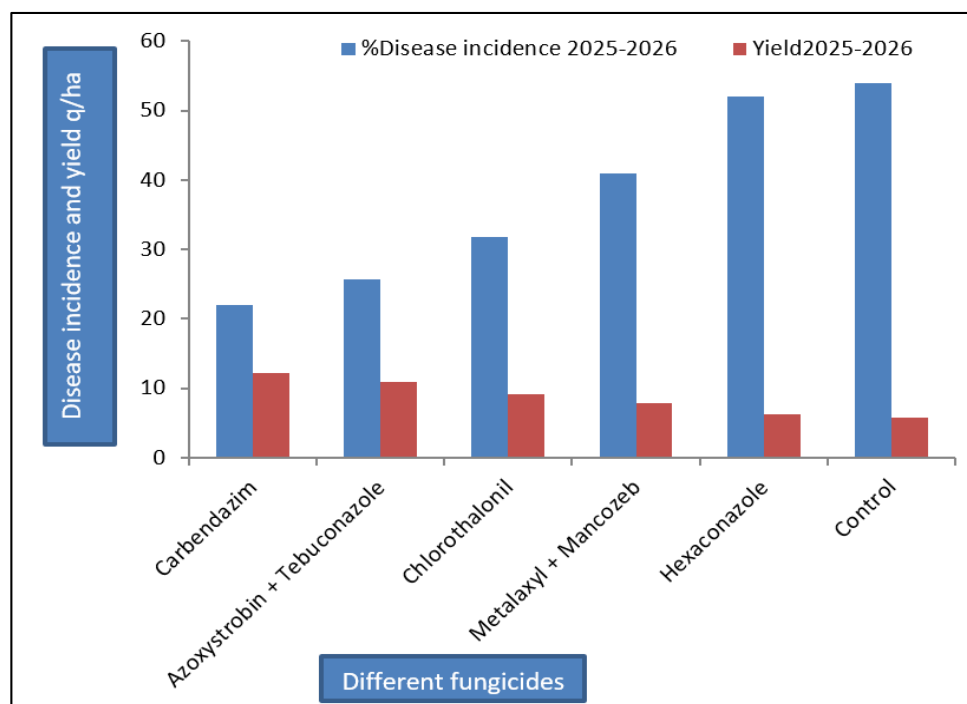


Fig 8: Effect of different fungicides against *Rhizoctonia bataticola* under *In-vivo* condition

References

1. Lokesh R, Rakholiya KB, Thesiya MR. Evaluation of different fungicides against *Macrophomina phaseolina* (Tassi) Goid. causing dry root rot of chickpea (*Cicer arietinum* L.) *in-vitro*. International Journal of Current Microbiology and Applied Science. 2020;9(7):2319-7706.
2. Meena RL, Godara SL, Meena AK, Meena PN. Evaluation of efficacy of different bioagents and fungicides against *Rhizoctonia solani* (Kuhn). International Journal of Current Microbiology and Applied Sciences. 2018;7(9):3694-3703.
3. Veena AG, Reddy ENP. Integrated disease management of dry root rot of chickpea. International Journal of Applied Biology and Pharmaceutical Technology. 2016;7:45-54.
4. Vincent JM. The esters of 4-hydroxyl benzoic acid and related compounds: Methods for the study of their fungistatic properties. Journal of Applied Biology. 1947;16:42-44.
5. Karkee A, Mandal DL. Efficacy of fungicide against *Rhizoctonia solani* inciting rhizome rot disease on large cardamom (*Amomum subulatum* Roxb.). International Journal of Applied Science and Biotechnology. 2020;8(1):61-64.
6. Nene YL, Reddy MV, Ghanekar AM, Amin KS. Field diagnosis of chickpea diseases and their control. ICRISAT Information Bulletin. 1991;28:1-52.
7. Reichert I, Hellinger E. On the occurrence, morphology and parasitism of *Sclerotium bataticola*. Palestine Journal of Botany. 1947;6:107-147.