

FIELD EVALUATION OF FUNGICIDES FOR THE MANAGEMENT OF *CERCOSPORA* LEAF SPOT IN BLACKGRAM

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Abstract– The aim of this study was to investigate the effects of different fungicides on the management of *Cercospora* leaf spot in black gram. The investigation was carried out for two years at experimental field of College of Agriculture, A.A.U., Jabugam, Gujarat. The experiment was laid out in randomized block design (RBD) with three replications. Fungicides were applied two times at 15 days interval after initiation of disease and results showed that among the tested treatments including control, Hexaconazole @ 0.1 % recorded a much lower per cent disease index (17.85%) which was at par with Azoxystrobin 23 SC @ 0.023% (17.93%) and they were significantly superior over control. The maximum mean grain yield was recorded from plots treated with Azoxystrobin 23 SC @ 0.023% (1817 kg/ha) followed by Hexaconazole 5 EC @ 0.1% (1698 kg/ha), while lowest mean grain yield (1256 kg/ha) was obtained from untreated control plots.

INTRODUCTION

Black gram (*Vigna mungo* L.) is an important short duration pulse crop having high nutritional value. India is the world's leading producer of black gram, accounting for more than 70 per cent of global output, followed by Myanmar and Pakistan. In India the total production of black gram is 22.76 lakh tonnes from an area of 38.48 lakh ha (Anonymous, 2021). In Gujarat, the total area under cultivation is 18.00 thousand hectares with the production of 13.00 thousand tonnes.

The lower productivity of black gram is mainly attributed to low genetic yield potentiality, indeterminate growth habit, canopy architecture, low partitioning efficiency, cultivation in marginal land and biotic and abiotic stresses. Among the biotic stresses powdery mildew (*Erysiphe polygoni*), *Cercospora* leaf spot (*Cercospora canescens*), anthracnose (*Colletotrichum lindemuthianum*) and mungbean yellow mosaic virus (MYMV) are the major diseases of black gram (Agarwal, 1991). Among all the diseases, *Cercospora* leaf spot (*Cercospora canescens*) is the most serious and wide spread disease causing severe losses in grain yield of black gram.

Cercospora leaf spot was first known to have

occurred in Delhi, India (Munjal *et al.*, 1960) and is prevalent in all parts of the humid tropical areas of India, Bangladesh, Indonesia, Malaysia, Philippines, Taiwan as well as Thailand. It becomes severe in the wet season causing 0.0 % to 100.0 per cent yield loss (Amin and Singh, 1987; Iqbal *et al.*, 1995). The present study was conducted to evaluate the efficacy of fungicides against *Cercospora* leaf spot disease for effective management.

MATERIALS AND METHODS

A field experiment was conducted to evaluate the efficacy of different fungicides against *Cercospora* leaf spot disease of black gram under field conditions for two years (2018 and 2020) at experimental field of Agriculture Research Station, Jabugam during *Kharif* season. Black gram variety T-9 was sown and trial was laid out in a Randomized block design with 8 treatments and 3 replications (Fig. 1, Table 2). Recommended agronomic practices were followed for raising the crop. The first spray of fungicides was given at the initiation of the disease and subsequently second spray was applied after 15 days of first spray. Disease intensity for *Cercospora* leaf spot was recorded at 10 days interval after first and second spray from 10 selected plants in each

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treatment (Fig. 2). Six leaves, *i.e.* 2 each from bottom, middle and top from each selected plant were observed and graded based on 0-9 scale given by Mayee and Datar (1986).

Table 1. Disease rating scale for *Cercospora* leaf spot disease of blackgram

| Scale | Description |
|-------|---|
| 0 | No symptoms on leaf |
| 1 | Up to 1% of leaf area covered by lesions |
| 3 | 1- 10% of leaf area covered by lesions |
| 5 | 11-25% of leaf area covered by lesions |
| 7 | 26-50% of leaf area covered by lesions |
| 9 | More than 50% of leaf area covered by lesions |

The Per cent disease intensity (PDI) was calculated by following formula described by Wheeler (1969).

$$\text{PDI} = \frac{\text{Sum of all numerical ratings} \times 100}{\text{No. of leaves observed} \times \text{Maximum rating scale}}$$

Table 2. Different fungicides and their concentrations

| Sr. No. | Treatments | Conc. (%) |
|----------------|-------------------------|-----------|
| T ₁ | Hexaconazole 5 EC | 0.075 |
| T ₂ | Hexaconazole 5 EC | 0.1 |
| T ₃ | Hexaconazole 5 EC | 0.125 |
| T ₄ | Azoxystrobin 23% SC | 0.017 |
| T ₅ | Azoxystrobin 23% SC | 0.023 |
| T ₆ | Azoxystrobin 23% SC | 0.028 |
| T ₇ | Wettable Sulphur 80% WP | 0.5 |
| T ₈ | Control | - |

RESULTS AND DISCUSSION

All the tested fungicides were effective in controlling *Cercospora* leaf spot of black gram in the field during two consecutive years of study. The different tested fungicides have differed in respect of disease intensity (%) and yield (kg/ha). In the first year (2018), treatment number -5, *i.e.* Azoxystrobin 23 SC @ 0.023% recorded lowest disease intensity (18.06%) and found statistically superior over treatment T₁ - Hexaconazole 5 EC @ 0.075%, T₃ - Hexaconazole 5 EC @ 0.125%, T₄ - Azoxystrobin 23% SC @ 0.017%, T₆ - Azoxystrobin 23% SC @ 0.028%, T₇ - Wettable Sulphur 80% WP @ 0.50% and Control but it showed statistical parity with treatment number - 2, *i.e.* Hexaconazole 5 EC @ 0.1% (18.23%). The data on grain yield revealed that all the treatments recorded higher grain yield than control. The highest grain yield was found in

treatment number - 5, *i.e.* Azoxystrobin 23 SC @ 0.023% (1859 kg/ha) followed by treatment number - 2 *i.e.* Hexaconazole 5 EC @ 0.1% (1700 kg/ha).

In the second year (2020), lower disease intensity was recorded in treatment number - 2, *i.e.* Hexaconazole 5 EC @ 0.1% (17.47%) which was at par with treatment number - 5, *i.e.* Azoxystrobin 23 SC @ 0.023% (17.81%). The highest disease intensity was recorded in control (30.12%). The data on grain yield revealed that highest grain yield was recorded in treatment number - 5, *i.e.* Azoxystrobin 23 SC @ 0.023% (1774 kg/ha) followed by treatment number - 2, *i.e.* Hexaconazole 5 EC @ 0.1% (1696 kg/ha).

The pooled data of two years revealed that lower disease intensity was recorded in treatment number - 2, *i.e.* Hexaconazole 5 EC @ 0.1% (17.85%) which was at par with treatment number - 5, *i.e.* Azoxystrobin 23 SC @ 0.023% (17.93%). The maximum mean grain yield was recorded from plots treated with Azoxystrobin 23 SC @ 0.023% (1817 kg/ha) followed by Hexaconazole 5 EC @ 0.1% (1698 kg/ha), while lowest mean grain yield (1256 kg/ha) was obtained from untreated control plots. Several researchers reported the effectiveness of triazole compounds against *Cercospora* leaf spot disease in black gram and green gram (Khunti *et al.*, 2005; Kavyashree *et al.*, 2017; Tiawri Smita *et al.*,



Fig. 1. General View of Experimental layout



Fig. 2. Symptoms of *Cercospora* leaf spot in black gram

Table 3. Efficacy of fungicides against *Cercospora* leaf spot of black gram

| Tr. No. | Treatment details | 2018 | | 2020 | | Pooled | | |
|----------------|---------------------------------|-------------------------|---------------|-------------------------|---------------|-------------------------|---------------|------------------------------|
| | | Disease intensity (PDI) | Yield (kg/ha) | Disease intensity (PDI) | Yield (kg/ha) | Disease intensity (PDI) | Yield (kg/ha) | Yield increased over control |
| T ₁ | Hexaconazole 5 EC @ 0.075% | 22.29 (27.99) | 1633 | 20.52 (26.81) | 1463 | 21.40 (27.40) | 1548 | 18.86 |
| T ₂ | Hexaconazole 5 EC @ 0.10% | 18.23 (24.98) | 1700 | 17.47 (24.63) | 1696 | 17.85 (24.80) | 1698 | 26.03 |
| T ₃ | Hexaconazole 5 EC @ 0.125% | 21.00 (27.10) | 1584 | 21.88 (27.78) | 1506 | 21.44 (27.43) | 1545 | 18.70 |
| T ₄ | Azoxystrobin 23% SC @ 0.017% | 21.78 (27.71) | 1538 | 17.87 (24.94) | 1596 | 19.82 (26.32) | 1567 | 19.84 |
| T ₅ | Azoxystrobin 23% SC @ 0.023% | 18.06 (25.02) | 1859 | 17.81 (24.84) | 1774 | 17.93 (24.93) | 1817 | 30.87 |
| T ₆ | Azoxystrobin 23% SC @ 0.028% | 23.25 (28.72) | 1621 | 21.20 (27.34) | 1455 | 22.22 (28.02) | 1538 | 18.33 |
| T ₇ | Wettable Sulphur 80% WP @ 0.50% | 26.40 (30.73) | 1615 | 24.72 (29.72) | 1283 | 25.56 (30.22) | 1449 | 13.31 |
| T ₈ | Control | 30.15 (33.17) | 1432 | 30.12 (32.70) | 1080 | 30.13 (32.93) | 1256 | - |
| | S.Em.± | 0.78 | 72.12 | 0.88 | 83.78 | 0.59 | 59.22 | |
| | CD at 5% | 2.26 | 218.78 | 2.56 | 254.15 | 1.65 | 170.20 | |
| | C.V. (%) | 6.81 | 7.70 | 7.95 | 9.79 | 7.39 | 8.72 | |

2021). Kavyashree *et al.* (2017) evaluated efficacy of different fungicides against *Cercospora* leaf spot infecting mungbean and reported that hexaconazole 5 EC @ 0.1% was most effective in reducing disease intensity with securing highest grain yield.

Conflict of interest: The research findings in this article do not have any conflict of interest.

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