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## Chemical management of *Helminthosporium vignicola*: The incitant of cowpea target leaf spot

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**Abstract**

The target leaf spot disease of cowpea incited by *Helminthosporium vignicola* is a new emerging threat to all the cowpea growers of Odisha. Coastal districts of Odisha are mainly inflicted by this leaf spot disease. An *in-vitro* experiment was conducted at the Plant Pathology Laboratory of College of Agriculture, OUAT, Bhubaneswar to test the effect of some fungicides on radial growth inhibition of *H. vignicola*. The efficacy of ten fungicides viz. Hexaconazole 5%EC, Zineb 75% WP, Hexaconazole 68% + Zineb 4%WP, Azoxystrobin 23% EC, Tebuconazole 250EC, Azoxystrobin 11%+ Tebuconazole 18.3%SC, Mancozeb 75%WP, Azoxystrobin8.3%+ Mancozeb 66.7% WG, Cymoxanil 8% + Mancozeb 64%WP and Difenconazole 250SC were carried out against *H. vignicola* by poison food technique. All the fungicides notably reduced the growth of fungus included under investigation. Among all the fungicides Azoxystrobin11%+Tebuconazole 18.3%SC recorded maximum fungal growth inhibition (98.7%) followed by Tebuconazole 250EC (95.1%) and Difenconazole 250 SC (89.0%).

**Keywords:** Cowpea, *Helminthosporium vignicola*, fungicides, management

**Introduction**

Cowpea is one of the most ancient human food sources and has probably been used as a crop plant since Neolithic times. It is indigenous to Africa from which it was introduced into other tropical and subtropical countries (Cobley and Steele, 1975) <sup>[1]</sup>. It is now grown in many regions of Africa, India, Brazil, U.S.A., the West Indies, Australia, Pakistan and parts of Europe and South America (Rachie and Roberts, 1974). In Odisha, the districts like Cuttack, Nayagarh, Kalahandi, Puri, Jagatsinghpur, Keonjhar, Nabarangpur and Boudh are leading areas where significant cowpea production occurs. In our state, cowpea occupies an area of 0.53 lakh hectares with an annual production of 0.40 lakh tonnes with an average productivity of 748 kg/ha (OUAT strategies for pulse production in rice fallows of Odisha, 2016). Unfortunately cowpea is inflicted by an array of diseases, but the target leaf spot disease caused by *Helminthosporium vignicola* is experienced for the first time during *Kharif*-2017 in AICRP on Vegetable crops, OUAT, Bhubaneswar and adjoining coastal tracts of Odisha. As the disease is occurring severely in recent years causing considerable loss in yield, not much is known about its management. Hence the current study was undertaken in the laboratory so as to evaluate the efficacy of various fungicides against this pathogen.

**Materials and Methods**

Cowpea leaf samples showing leaf spot symptoms were collected from AICRP on Vegetable Crops, OUAT, Bhubaneswar and some coastal districts of Odisha. Leaves with typical symptoms were first washed in tap water and then cut into small bits measuring 2 mm size. These bits were surface sterilized with 0.1 per cent HgCl<sub>2</sub> solution for two minutes followed by three changes of sterilized distilled water. These bits were placed on potato dextrose agar under aseptic condition. Inoculated plates were incubated at 27 °C for seven days. After seven days of incubation, fungal colonies completely covered the plates and become black in colour indicating the production of spores. The pure culture so obtained was maintained on PDA slants at 4+1 °C.

The comparative study of different fungicides on the growth of the fungus under *in-vitro* condition was assessed by poison food technique.

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### Poison food technique

The fungicides like Hexaconazole 5%EC, Zineb 75% WP, Hexaconazole 68% + Zineb 4%WP, Azoxystrobin 23% EC, Tebuconazole 250EC, Azoxystrobin11%+Tebuconazole 18.3%SC, Mancozeb, Azoxystrobin8.3%+Mancozeb 66.7% WG, Cymoxanil 8% + Mancozeb 64%WP and Difenconazole 250SC were used for *in-vitro* assay. The prepared PDA medium was first sterilized in the autoclave at 15psi for 15-20 minutes. The required concentrations of chemicals were prepared and incorporated into sterilized, cooled potato dextrose agar medium. Twenty ml of medium was poured into 90 mm sterilized Petriplates and all plates were inoculated with actively growing 9 mm mycelial disc of test fungus. The petriplate containing PDA without any fungicide served as control. Three replications were maintained for each treatment. These plates were incubated at  $25 \pm 1$  °C for fourteen days and then colony diameter was recorded when the fungus attained maximum growth in control petriplates. Per cent inhibition of mycelial growth over control was calculated by using the formulae of Vincent (1947) [4].

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

Where,

I = Per cent inhibition of mycelium  
C = Growth of mycelium in control  
T = Growth of mycelium in treatment

The data obtained on per cent growth inhibition of test fungus were statistically analysed and corresponding angular transformed values were stated.

### Results and Discussion

It is clearly inferred from the above table 1 that most of the fungicides were efficient in restricting the growth of *H. vignicola* as compared to control. Among all the fungicides tested, Azoxystrobin11%+Tebuconazole 18.3%SC exhibited maximum fungal growth inhibition (98.7%) followed by Tebuconazole 250EC (95.1%). The next best inhibition was recorded by Difenconazole 250 SC followed by Hexaconazole 68% + Zineb 4%WP which opined more than 85 per cent inhibition. The minimum growth inhibition was recorded by Zineb 75% WP (62.9%). All the fungicides inhibited the mycelial growth over control ranging from 62.9 to 98.7 per cent.

Harlapur *et al.* (2007) [3] reported that maximum mean percent inhibition of mycelial growth of *Exserohilum turcicum* was obtained with Mancozeb @0.25% while working on turcicum leaf blight disease in maize which supports the present findings.

Since target leaf spot disease is a new report from cowpea in Odisha condition and to manage the disease, some of the promising chemicals such as Azoxystrobin 11%+Tebuconazole 18.3% SC, Tebuconazole 250EC and Difenconazole 250 SC have proved efficacious against *H. vignicola*. Therefore, the chemicals may be tested under field condition in Multi locational trials (MLTs) to draw the conclusion for greater interest of farming community.

**Table 1:** Efficacy of different fungicides on mycelial growth of *Helminthosporium vignicola*

| Sl. No | Chemical name                       | Concentration (%) | Mean Mycelial Growth (mm) | *Per cent growth inhibition |
|--------|-------------------------------------|-------------------|---------------------------|-----------------------------|
| 1      | Hexaconazole 5% EC                  | 0.05              | 20.50                     | 69.7(56.60)**               |
| 2      | Zineb 75% WP                        | 0.25              | 25.0                      | 62.9(52.48)                 |
| 3      | Hexaconazole 68% + Zineb 4% WP      | 0.20              | 8.38                      | 87.5(69.30)                 |
| 4      | Azoxystrobin 23% EC                 | 0.10              | 22.31                     | 66.9(54.88)                 |
| 5      | Tebuconazole 250EC                  | 0.10              | 3.26                      | 95.1(77.21)                 |
| 6      | Azoxystrobin11%+Tebuconazole18.3%SC | 0.10              | 0.83                      | 98.7(83.45)                 |
| 7      | Mancozeb 75% WP                     | 0.25              | 24.83                     | 63.2(52.65)                 |
| 8      | Azoxystrobin8.3%+mancozeb 66.7% WG  | 0.15              | 12.73                     | 81.1(64.23)                 |
| 9      | Cymoxanil 8% + mancozeb 64%WP       | 0.15              | 19.4                      | 71.2(57.54)                 |
| 10     | Difenoconazole 250 SC               | 0.05              | 7.4                       | 89.0(70.63)                 |
| 11     | Control                             | -                 | 67.5                      | -                           |
|        | SE(m)±                              | 0.091             |                           |                             |
|        | CD(0.05)                            | 0.268             |                           |                             |



**Fig 1:** Maximum inhibition of test pathogen by fungicides. A. Azoxystrobin 11% + Tebuconazole 18.3% SC, B. Tebuconazole 250EC, C. Control

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