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# Management of alternaria leaf blight of groundnut through fungicides

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**Abstract**
A field trial was carried out at Main Oilseeds Research station, Junagadh Agricultural University, Junagadh during summer 2011 to 2015 to know the effect of various fungicide against alternaria leaf blight and their impact on groundnut pod yield. Seven treatments *viz*. mancozeb @ 0.2%, copper oxychloride @ 0.2%, hexaconazole @ 0.0075%, tebuconazole @ 0.0375%, difenoconazole @ 0.025%, propiconazole @ 0.025% applied three time at 35, 50 and 65 days after sowing (DAS) including one control were imposed. Among the different fungicide, mancozeb @ 0.2% three sprays at 35, 50 and 65 days after sowing were recorded minimum disease (22.95%), maximum pod (1873 kg $ha^{-1}$) as well as haulm (4648 kg/ha) yield under the under the field condition followed by difenoconazole @ 0.025% three sprays at 35, 50 and 65 DAS which reducing alternaria leaf blght (24.47%), increasing pod (1846 kg $ha^{-1}$) and haulm (4619 kg $ha^{-1}$) yield. Moreover, on the basis of net realization per hector, mancozeb @ 0.2% obtained highest earning (Rs.14215), highly effective, economical in reducing alternaria leaf blight disease of groundnut followed by three sprays of difenoconazole @ 0.025% and hexaconazole @ 0.0075% with Rs. 9230 net realization noted in both the fungicide.

**Keywords:** Alternaria leaf blight, management, fungicide

## Introduction
The total area of groundnut cultivation in India is 52.50 lakh ha which accounts for total production of 94.72 lakh tones with productivity of 1804 kg/ha. Among the major groundnut growing states, Gujarat is the most important one accounting for 18.42 lakh ha total area with 49.18 lakh tones production and productivity of 2670 kg/ha (Anonym, 2016) [2]. Though Alternaria leaf blight in groundnut has been reported earlier, this has become a very severe problem during summer in farmers' fields. The symptoms of the disease are blighting of leaf tip and margins. Blighting progresses towards the midrib region and defoliation occurs during severe infection. The symptom resembles those caused by iron deficiency. The causal organism has been identified as *Alternaria alternate (Fr.) Keissler* The alternaria disease has been observed in the range of 0 to 67% and reduces pod and fodder yields (Kumar *et.al*., 2012) [4]. Therefore, the experiment was conducted to find out the most effective chemical (s) for the management of Alternaria leaf blight disease of groundnut.

## Materials and Methods
A field trial was laid out on Main Oilseed Research Station farm, Junagadh Agriculture University, Junagadh during *Summer* 2011 to 2015 season. Groundnut varieties GG -6 was sown in 5.0 x 2.4 gross and 4 x 1.8 net plot size adopting a spacing of 30 x 10 cm. Seven treatments *viz*. mancozeb @ 0.2%, copper oxychloride @ 0.2%, hexaconazole @ 0.0075%, tebuconazole @ 0.0375%, difenoconazole @ 0.025%, propiconazole @ 0.025% applied three time at 35, 50 and 65 days after sowing (DAS) including one control were imposed with four replications in the randomization block design. Required quantity of fungicide solution of each treatment was prepared for spraying the experiment plots. The first spray starting immediately after the appearance of the alternaria leaf blight disease. Data on fungal disease cause by *A. alternata* were recorded from five randomly selected plants; using 0-9 grade. Per cent disease intensity (PDI) was calculated using the formula of the Wheeler (1969) [12] per cent disease control in each treatment calculated.

## Result and Discussion

### Alternaria leaf blight disease

Five years pooled results presented in Table 1 reveled that all the fungicides significantly reduced alternaria leaf blight disease as compared to control. Significantly minimum (22.95%) alternaria blight was noted in the treatment of three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS followed by three sprays of difenoconazole @ 0.025%, propiconazole @ 0.025%, Copper oxychloride 0.2%, hexaconazole 0.0075%, tebuconazole 0.0375% with 24.47, 24.98, 26.05, 26.28, 26.96 per cent, respectively at 35, 50 and 65 DAS. All the treatment found at par with each other and equally effective in reducing the alternaria leaf blight disease in groundnut. Maximum (38.35%) alternaria leaf blight was recorded in the control.

The three sprays mancozeb @ 0.2% effectively reduced alternaria blight disease (22.95%) followed by difenoconazole @ 0.025%, propiconazole @ 0.025%, copper oxychloride 0.2%, hexaconazole 0.0075%, tebuconazole 0.0375% with 24.47, 24.98, 26.05, 26.28, 26.96 per cent, respectively at 35, 50 and 65 DAS. These results are in accordance with those obtained by Sing and sing (2006) [10] they reported that three consecutive spray of mancozeb resulted in maximum control of alternaria blight intensity followed by schedule with two consecutive spray of mancozeb (0.2%) and third of redomil MZ (0.25%) in Indian mustard. Foliar spray of mancozeb have been found most effective in disease management in mustard and repeseed-mustard (Meena *et al.,* 2004, 2011; Mondal *et al.,* 2008) [5, 6, 9]. Lowest alternaria blight disease severity (20.3%) was recorded in mancozeb seed treatment along with foliar spray 0.25 in mustard (Jha *et. al.,* 2013) [3]. Wadibhasme *et al.* (1991) [11]. conducted field trial for three years and found mancozeb most superior amongst all the fungicides followed by triademefon, chlorothalonil and ziram, which were at par with each other in sunflower. Mesta *et al.* (2003) [7]. reported that hexaconazole as effective fungicide against alternaria blight of sunflower which support the present findings.

### Pod yield and haulm yield

Looking to five years pooled results of pod yield revealed that all the fungicide tested in field condition gave significantly higher yield as compared to control. The highest pod yield (1873 kg ha$^{-1}$) was obtained in three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS followed by three sprays of difenoconazole @ 0.025% at 35, 50 and 65 DAS (1846 kg ha$^{-1}$). Both the treatments were found at par with each other. Copper oxychloride 0.2%, tebuconazole 0.0375%, propiconazole @ 0.025%, hexaconazole 0.0075%, three sprays at 35, 50 and 65 DAS were showed next batter fungicide with 1768, 1759, 1751 and 1747 kg ha$^{-1}$ pod yield, respectively.

The five year pooled data reveled that all the fungicidal treatments significantly higher haulm yield as compared to the control. Significantly maximum haulm yield (4648 kg/ha) was recorded in the treatment of three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS followed by three sprays of difenoconazole @ 0.025%, propiconazole @ 0.05 %, copper oxychloride 0.2%, hexaconazole 0.0075%, tebuconazole 0.0375% with 4619, 4581, 4574, 4546 and 4412 haulm yield kg ha$^{-1}$, respectively at 35, 50 and 65 DAS. All the treatment remain at par with each other. Lowest haulm yield was noted in control (3823 g ha$^{-1}$).

In present study mancozeb was found batter in reducing the disease and increase pod yield. Similar result was obtained by Akbari and Dhruj (1995) [1]. they found that minimum disease intensity (25.60 per cent) and maximum yield (972 kg/ha) were obtained in plots treated with mancozeb (0.2%) three sprays in cumin crop. Rai *et al.,* 2014 reported that in case of seed treatment and foliar spray of metalaxyl with mancozeb was found most effective in reducing disease severity and increasing yield (44.0 and 37.6%). Mesta *et al.* (2011) [11]. also revealed that hexaconazole (0.1%) and propiconazole (0.1%) recorded significantly lowest PDI (35.63 and 37.80) and highest sunflower seed yield (9.49 q ha$^{-1}$ and 9.86 q ha$^{-1}$) respectively than all other treatments.

### Economics

The highest ICBR (1:7.00) was recorded under the treatment of three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS (Table 2) followed by three sprays of hexaconazole @ 0.025% at 35, 50 and 65 DAS (1:5.45), three sprays of propiconazole@ 0.025% at 35, 50 and 65 DAS (1:3.98) and three sprays of difenoconazole @ 0.025% at 35, 50 and 65 DAS (1:2.49). However, the highest income increased over control (Rs. 16583) was obtained three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS followed by three sprays of difenoconazole 0.025% at 35, 50 and 65 DAS. Although, highest net return of Rs.14215 was observed in fungicide mancozeb followed by both the fungicide hexaconazole and difenoconazole (Rs. 92310/ha).

## Conclusion

The disease incidences, pod yield and haulm yield data revealed the lowest disease (22.95%), highest pod (1873 kg/ha) as well as haulm (4648 kg/ha) yield was recorded under the fungicidal treatment of three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS with a maximum ICBR (1:7.00). Therefore, on the basis of net realization per hector, it is concluded that three sprays of mancozeb @ 0.2% at 35, 50 and 65 DAS (Rs.14215) is highly effective, economical in reducing alternaria leaf blight disease of groundnut followed by three sprays of difenoconazole 0.025% and hexaconazole 0.0075% at 35, 50 and 65 DAS with Rs.9230 net realization noted in both the fungicide.

**Table 1:** Effect of different fungicides on *alternaria* leaf blight disease of groundnut

| S. No. | Treatments | Pooled Mean (2011-15) Five year | | |
|---|---|---|---|---|
| | | Alternaria leaf blight (%) | Pod yield (kg ha$^{-1}$) | Haulm yield (kg ha$^{-1}$) |
| 1 | Three sprays of Mancozeb @ 0.2% at 35, 50 and 65 DAS | 28.62 (22.95) | 1873 | 4648 |
| 2 | Three sprays of Copper oxychloride @ 0.2% at 35, 50 and 65 DAS | 30.69 (26.05) | 1768 | 4574 |
| 3 | Three sprays of Hexaconazole @ 0.0075% at 35, 50 and 65 DAS | 30.84 (26.28) | 1747 | 4553 |
| 4 | Three sprays of Tebuconazole @ 0.0375% at 35, 50 and 65 DAS | 31.28 (26.96) | 1759 | 4412 |
| 5 | Three sprays of Difenoconazole @ 0.025% at 35, 50 and 65 DAS | 29.65 (24.47) | 1846 | 4619 |
| 6 | Three sprays of Propiconazole @ 0.025% at 35, 50 and 65 DAS | 29.99 (24.98) | 1751 | 4581 |
| 7 | Control | 38.26 (38.35) | 1510 | 3823 |

| | | | | |
|---|---|---|---|---|
| | S.Em± | 0.95 | 37.04 | 106.31 |
| | C D at 5 % | 2.77 | 104.23 | 310.31 |
| | C V % | 9.11 | 8.65 | 07.32 |
| | Y S.Em.± | 0.80 | 31.30 | 89.85 |
| | Y C.D. at 5 % | 2.34 | 88.09 | 262.26 |
| | Y x T S.Em.± | 1.43 | 82.82 | 179.16 |
| | Y x T C.D. at 5 % | 4.02 | NS | 504.22 |

Numerals in parentheses are retransformed values. * Arcsine transformation

**Table 2:** Economics of various fungicides

| S. No | Treatments | Pod yield (kg/ha) | Haulm yield (kg/ha) | Gross income (Rs.) | Total Cost (Rs.) | Income increase over control | Net realization | ICBR |
|---|---|---|---|---|---|---|---|---|
| 1 | Three sprays of Mancozeb @ 0.2% at 35, 50 and 65 DAS | 1873 | 4648 | 86540 | 2368 | 16583 | 14215 | 1:7.00 |
| 2 | Three sprays of Copper oxychloride @ 0.2% at 35, 50 and 65 DAS | 1768 | 4574 | 82155 | 5150 | 12198 | 7048 | 1:2.37 |
| 3 | Three sprays of Hexaconazole @ 0.0075% at 35, 50 and 65 DAS | 1747 | 4553 | 81263 | 2075 | 11305 | 9230 | 1:5.45 |
| 4 | Three sprays of Tebuconazole @ 0.0375% at 35, 50 and 65 DAS | 1759 | 4412 | 81390 | 5450 | 11433 | 5983 | 1:2.10 |
| 5 | Three sprays of Difenoconazole @ 0.025% at 35, 50 and 65 DAS | 1846 | 4619 | 85388 | 6200 | 15430 | 9230 | 1:2.49 |
| 6 | Three sprays of Propiconazole @ 0.025% at 35, 50 and 65 DAS | 1751 | 4581 | 81493 | 2900 | 11535 | 8635 | 1:3.98 |
| 7 | Control | 1510 | 3823 | 69958 | | 0 | - | - |

**Table 3:** Supplementary Data

| **Following market price consider for the work out of fungicides economics** | | | | | | |
|---|---|---|---|---|---|---|
| **Prices of materials :** Groundnut pod =40 Rs./ kg, Groundnut fodder =2.5 Rs./kg Mancozeb=Rs. 350/kg, Copper Oxy chloride= Rs. 700/kg, Hexaconazole= Rs. 500/kg, Tebuconazole= Rs. 2000/kg, Difenoconazole= Rs. 3500/kg, Propiconazole= Rs. 1300/kg | | | | | | |
| **Per hectare labor & Chemical cost/3 spray** | | | | | | |
| Details | Mancozeb | Copper Oxychloride | Hexacona-zole | Tebucona-zole | Difencona-zole | Propicona-Zole |
| Chemical cost Rs. | 1418 | 4200 | 1125 | 4500 | 5250 | 1950 |
| 3 Spray/ha Labor cost Rs. | 950 | 950 | 950 | 950 | 950 | 950 |
| Total cost Rs. | 2368 | 5150 | 2075 | 5450 | 6200 | 2900 |
| **Per hectare labor cost/3 spray** | | | | | | |
| Female Labor 150 Rs./day | | Trained Labor 250 Rs./day | | Cost of 3 spray/ha Total Rs. | | |
| 3 | | 2 | | - | | |
| 450 | | 500 | | 950 | | |

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