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# Field efficacy of fungicides to manage leaf spot of areca nut

## Abstract

Arecanut one of the major plantation crops of India suffers heavily due to leaf spot disease caused by the fungus Colletotrichum gloeosporioides and Phyllosticta arecae. This disease has caused 60 per cent yield loss in the neglected orchards of uttar kannada district. The experiment conducted during kharif 2012-13 and 2013-14 revealed that triazole molecules namely hexaconazole and difenconazole were found superior in reducing the disease incidence and maximizing the yields.

**Keywords:** arecanut, triazoles, management

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Gurudatt M Hegde

Assistant Professor of Plant Pathology, College of Forestry, Sirsi, University of Agricultural Sciences, India

**Correspondence:** Gurudatt M Hegde, Assistant Professor of Plant Pathology, College of Forestry, Sirsi, University of Agricultural Sciences, Dharwad, Karnataka, India, Email gurudatthegde@gmail.com

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## Introduction

Areca nut (*Areca catechu L.*) is a perennial fruit plant belonging to the family palmaceae and it is an important cash crop of India. It is the most important crop grown mainly in hill and coastal parts of the country. In most of the gardens areca nut is grown in multistoried cropping systems. Leaf spot of areca nut caused by fungi *Colletotrichum gloeosporiodes and Phyllosticta arecae* attacks the crop even at the seedling stage. Established areca trees suffer due to this disease and cause yield loss up to 60 percent. Leaf spot is a very serious problem in all over the areca nut growing regions of India. Leaf spot of areca nut though a minor disease in the past, has now become a major problem in areca nut cultivation especially during rainy season. The disease was first reported from India by Rao in 1964.[1] The areca palm *(Areca catechu L.)* is one of the important plantation crops in India, Bangladesh and Sri Lanka is susceptible to various diseases and leaf blight caused *Phyllosticta arecae* is one of the important diseases causing heavy damage especially during rainy season. In Uttar Kannada district average per cent infection per leaf due to leaf spot disease ranged from 2.13 to 29.65, 4.18 to 36.70 and 2.50 to 25.35 on areca nut.[2] Of late the leaf spot disease is becoming very alarming and has lead to the poor growth of the young seedlings and also grown up palms. Farmers are still using the age old chemicals like carbendaziim, mancozeb and chlorothalonil which were earlier recommended.[3,4] Therefore, present investigation was more focused on use of triazole compounds for the management of leaf spot of Areca nut.

## Materials and methods

Field efficacy of fungicides were tested against the management of leaf spot disease of areca nut during *kharif* 2012and 2013 under natural endemic field conditions. The details of the experiments are given here under.

| Year : Kharif 2012 and 2013 | Location : Farmers fields of sirsi taluk |
|---|---|
| Variety : Sirsi local | Design : RCBD |
| No. of treatments:08 | Observations: Percent Disease Index, Yield & Cost economics |
| No. of replications :03 | Spacing :9'X9' |

### Details of the treatments are given below

| Sl. No | Treatment | |
|---|---|---|
| | First spray (after onset of the disease) | Second spray (30days after I spray) |
| 1 | Carbendazim@ 0.1% | Carbendazim@ 0.1% |
| 2 | Mancozeb@ 0.2 % | Mancozeb@ 0.2 % |
| 3 | Chlorothalonil @ 0.2% | Chlorothalonil@ 0.2% |
| 4 | Saaf@ 0.2% (Carbendazim+Mancozeb) | Saaf@ 0.2%(Carbendazim+Mancozeb) |
| 5 | Difenconazole @ 0.1% | Difenconazole@ 0.1% |
| 6 | Hexaconazole@ 0.1% | Hexaconazole@ 0.1% |
| 7 | Potassium phosphonate@ 0.3% | Potassium phosphonate@ 0.3% |
| 8 | Control (untreated) | |

First sprays of each fungicide were taken up soon after the occurrence of the disease and further spray was given at 30 days interval. New molecules were tested against the recommended fungicides. One untreated control treatment was also maintained for comparison. Percent disease index was calculated from these observations by using 0-6 scale.[5]

Where,

0=no symptoms

1 less than 1% of lamina with symptoms (only streaks and/or up to 10 spots)

2= 1-5% lamina with symptoms

3= 6-15 % lamina with symptoms

4= 16-33% lamina with symptoms

5= 34-50% lamina with symptoms

6=51-100%

Per cent disease index (PDI) was calculated by using the formula.[6]

$$PDI = \frac{Sum\ of\ numerical\ ratings}{Total\ no.\ of\ observations\ X\ highest\ disease\ grade} \times 100$$

### Yields and economics

Yields of arecanuts was recorded by harvesting separately and converted it in to q/ac.

## Results and discussion

Various treatments have been tried for effective management of leaf spot disease of Arecanut during 2009 and 2010 and the results are presented in Table 1 during the present investigations new molecule Hexaconazole and Difenconazole was used and compared with the recommended molecules. During 2009, Hexaconazole @0.1% and Difenconazole @0.1% were found superior in reducing the leaf spot disease incidence to the extent of 15.60 % and 13.28% respectively. Similar trend was observed during 2010. The pooled data of both the years also revealed the lesser disease incidence of 16.07 % and 13.74% respectively was recorded in Difenconazole @0.1% and Hexaconazole @0.1% However, it is clear from the pooled data of the two years that, Saaf, a combi product consists of carbendazim and mancozeb was found to be the next effective treatment (24.15%) and found on par with carbendazim (25.78%) and mancozeb (25.65%). The maximum disease incidence was recorded in the untreated control plots (49.68%). The yield data was also recorded on plot basis and converted in to quintal/ha basis (Table 1). During 2009 the maximum yields of 28.76q/h and 27.42q/ha was recorded in the treatments sprayed with Difenconazole @0.1% and Hexaconazole @0.1% respectively. This is followed by 23.75 q/h in the treatment spared with carbendazim @0.1%. Almost similar trend was recorded during 2010. The pooled data revealed that, the significant higher yields were obtained in the treatments sprayed with Difenconazole @ 0.1% (27.52q/ha) and Hexaconazole @0.1%(26.69 q/ha) and both these treatments found on par with each other. This is followed by 23.05 q/ha in carbendazim @ 0.1% sprayed plots followed by Mancozeb @0.2% (22.20 q/h), saaf@0.2% (21.51q/ha) and chlorothalonil @ 0.2% (20.92 q/ha) which also are found on par with each other. The least yields were recorded in the untreated control plots (16.48q/ha).

The effectiveness of Difenconazole @0.1% is also in agreement with the studies conducted by Jamadar and Patil[7] in reducing the anthracnose disease of pomegranate caused by *Colletotrichum spp.* Hegde and Mesta[8] reported, that, the plots sprayed thrice with Haxaconazole @0.1% has significantly reduced the leaf spot disease of banana to the extent of 13.74 per cent. The effectiveness of the Hexaconazole was judged on the basis of increased yield per unit along with the reduced disease intensity. Three sprays with hexaconazole (H-H-H) @0.1% has considerably reduced the rust of soybean with the highest yields of 24.79q/ha along with enhanced impact on quality traits like protein and oil content on the soya seeds. This treatment also resulted in obtaining the highest benefit cost ratio.[9] Patel and Joshi[10] reported that, both the triazole compounds hexaconazole @0.1% and difenconazole @0.1% were found promising in managing the leaf spot of turmeric. The effectiveness of triazole fungicides like Hexaconazole and Difenconazole may be attributed to their interference with the biosynthesis of fungal sterols and inhibit the ergosterol biosynthesis. In many fungi, ergosterol is essential to the structure of cell wall and its absence cause irreparable damage to cell wall leading to death of fungal cell. These results are in agreement with the studies conducted by Laxman[11]and Jayalakshmi.[11–13]

**Table 1** Management of leaf spot of Arecanut

| Sl. No | Treatment | PDI | | | Yield q/ha | | |
|---|---|---|---|---|---|---|---|
| | | 2012 | 2013 | Pooled | 2012 | 2013 | Pooled |
| 1 | Carbendazim @ 0.1% | 25.21 | 26.35 | 25.78 | 23.75 | 22.36 | 23.05 |
| | | -30.13 | -30.92 | -30.51 | | | |
| 2 | Mancozeb @ 0.2 % | 26.96 | 24.7 | 25.65 | 20.61 | 23.78 | 22.2 |
| | | -31.24 | -29.8 | -30.4 | | | |
| 3 | Chlorothalonil @ 0.2% | 27.48 | 26.45 | 29.96 | 20.45 | 21.39 | 20.92 |
| | | -31.63 | -30.98 | -31.28 | | | |
| 4 | Saaf @ 0.2% | 24.67 | 23.63 | 24.15 | 21.24 | 21.78 | 21.51 |
| | | -29.73 | -29.06 | -29.47 | | | |
| 5 | Difenconazole @ 0.1% | 13.28 | 14.21 | 13.74 | 28.76 | 26.28 | 27.52 |
| | | -21.39 | -22.34 | -21.75 | | | |
| 6 | Hexaconazole @ 0.1% | 15.6 | 16.55 | 16.07 | 27.42 | 25.91 | 26.69 |
| | | -23.26 | -24.04 | -23.63 | | | |
| 7 | Akomin @ 0.3% | 39.59 | 32.09 | 35.84 | 17.5 | 21.37 | 17.93 |
| | | -39 | -34.52 | -36.77 | | | |
| 8 | Control | 52.87 | 47.07 | 49.68 | 15.27 | 17.57 | 16.48 |
| | | -46.61 | -43.34 | -44.77 | | | |
| SEm+ | | 1.19 | 1.41 | 1.28 | 0.34 | 0.46 | 0.44 |
| CD @ 5% | | 4.2 | 3.28 | 3.84 | 1.13 | 1.38 | 1.32 |
| CV | | 15.23 | 16.24 | 16.69 | | | |

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## Conflicts of interest

The authors declared there is no conflict of interest.

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