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# Chemical management of inflorescence dieback of Arecanut under Karnataka conditions

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### Abstract

Among the various factors causing considerable loss in production of arecanut in the state, inflorescence dieback is a destructive disease of arecanut caused by the fungus *Colletotrichum gloeosporioides*. During 2014, a field trial was undertaken to develop management practices to reduce the severity and spread of the disease at ZAHRS, Shivamogga, Karnataka. Among the tested five fungicidal treatments spraying of 0.25% Carbendazim 12%+ Mancozeb 63% was found significantly superior in controlling the disease. The results from the experiment reveals that, Carbendazim 12%+ Mancozeb 63% (0.25%) sprayed trees has significantly increased the number of nuts/bunch (best treatment was found 80.79), green nut wt/ac (9521.46 kg) and dry nut wt/ac (1238.16 kg) with decreased number of infected inflorescence (0.81/palm) and fallen nuts/palm (4.73). Whereas, in unsprayed control plot a minimum green nut and dry nut yield of 5266.47 and 1238.16 kg/ac was recorded. The B:C ratio was also found higher in Carbendazim 12% + Mancozeb 63% (1:1.65) and Propineb (1:1.61) sprayed plots compare to other fungicides and untreated control plots over three seasons. From the present findings it could be concluded that Carbendazim 12% + Mancozeb 63% (0.1%) was very effective fungicide for lowering inflorescence dieback severity under field condition.

**Keywords:** Arecanut, *Colletotrichum gloeosporides*, fungicides, management, B:C ratio

### Introduction

Arecanut palm (*Areca catechu* L.) is mainly cultivated in states of Karnataka, Kerala and Tamil Nadu. Plantation level cultivation is also seen in parts of Andhra Pradesh, Assam, Maharashtra, Meghalaya and West Bengal. The productivity of palm is affected by a number of diseases and disorders. Some of the diseases like, fruit rot, yellow leaf disease, basal stem rot and inflorescence dieback are economically important since they cause damage to the product as well as the crop. Dieback of inflorescence and button shedding is one of the reasons for low fruit set in areca palms<sup>[3]</sup>. *Colletotrichum gloeosporides* Penz. and Sacc, is reported to cause anthracnose in arecanut and the fungus could survive in the debris of previous year's infected bunches for eight months<sup>[9]</sup>. Studies carried out in the mid seventies revealed that up to 60 per cent of palms are affected by this disease<sup>[7]</sup>. However systematic survey reports lack to assess the actual crop loss caused by the disease. The disease is seen throughout the year but becomes severe during summer months i.e., February to May. Yellowing, browning and shedding of buttons are accelerated by water stress and high temperature prevailing during summer<sup>[4]</sup>.

No systematic efforts were made earlier to develop an effective management practices against the disease with special reference to the type of damage, climatic condition and severity of the disease in Karnataka. Considering the economic loss of the crop, present study was undertaken to elucidate the efficacy of fungicides in effectively controlling the disease, as fungal pathogens were consistently observed in the shed female flowers and infected inflorescence.

### Material and Methods

The experiment in randomized block design was laid out in Arecanut Garden of Zonal Agricultural and Horticultural Research Station, Shivamogga during 2014. The arecanut inflorescence is treated with different fungicides viz., 0.25% of Carbendazim 12%+ Mancozeb 63% and Propineb 70%, 0.3 per cent of Mancozeb and copper oxy chloride with untreated check. Arecanut inflorescence is sprayed thrice during January to February in 15 days interval. The observation were taken on Number of Healthy inflorescence per palm, Number of infected inflorescence per palm, Number of fallen nuts per bunch,

Number of nuts per bunch, and also yield parameters including green nut weight and dry nut weight were recorded and benefit cost ratio was calculated and collected data was analyzed statistically.

### Data analysis

The data was subjected to statistical analysis by adopting Fisher's method of analysis of variance as outlined by Gomez and Gomez [5]. The critical difference (CD) values are given at 5 per cent level of significance, wherever the 'F' test was significant

### Results and Discussion

The use of fungicides has become an inevitable method in the management of plant diseases particularly in arecanut. During 2014, experiment was conducted Arecanut Garden of Zonal Agricultural and Horticultural Research Station, Shivamogga the rainfall was distributed uniformly and the inflorescence dieback disease incidence was moderate to heavy. The results revealed that all the fungicides tested were significantly effective in reducing disease incidence.

The data presented in Table 1 indicated that, application of companion @ 0.25% (Carbendazim 12%+ Mancozeb 63%) has significantly increased the number of nuts/bunch (best treatment was found 80.79), green nut wt/ac (9521.46 kg) and dry nut wt/ac (1238.16 kg) with decreased number of infected inflorescence (0.81/palm) and fallen nuts/palm (4.73), over control and on par with other treatments. The next best treatment was found to be application of Anthracol @ 0.25% in reducing the infected inflorescence/palm (1.00/palm) and fallen nuts (6.60/palm) compared to copper oxychloride and

mancozeb treatments and untreated check.

The maximum yield and B: C ratio (1238.19 kg/ac and 1:1.65) was recorded in plots that received Carbendazim + Mancozeb spray followed by (1148.24 kg/ac with 1:1.61 B:C ratio). Whereas the minimum yield and B: C ratio was recorded in unsprayed control plot (684.87 kg/ac with 1:1.35B: C ratio) (Table 2). In early sixties, copper fungicide alone and in combination with insecticide were tested. High retention of tender nuts was reported when a combination of shell copper and endrex [1] or one per cent bordeaux mixture alone or in combination with endrex was sprayed [2]. Later, different fungicides were tested against *C. gloeosporioides* and found that the fungicides benomyl 0.1 per cent, captan 0.25 per cent, thiram 0.25 per cent and phenyl mercury urea 0.1 per cent were effective in ingibiting the radial growth of the fungus [8]. Yashoda *et al.* [10] reported in vitro inhibition of the fungus by the fungicides blitox, zineb, cumin-2 and mancozeb. Fungicides such as benomyl (0.1 %), captan (0.25%), thiram 0.25%) and phenyl mercury urea (0.1 %) inhibited the mycelial growth of *Colletotrichum gloeosporioides in vitro*. Removal and destruction of severely affected inflorescences and spraying of Dithane Z-78 or aureofungin- sol + copper sulphate (50 ppm each) were effective in reducing the disease incidence [8]. According to them, the first spray should be scheduled at the time of opening of the female flowers and second after a gap of 20-25 days. Nidhina and Hegde [6] reported that 0.05% of Mixol 72 with *T. virens* and *T. virens* + 0.05% Blitox 50 W (80.95%) having inhibitory effect on the growth of *C. gloeosporioides*.

**Table 1:** Effect of fungicides on inflorescence die back and yield during 2014

Treatments	Avg no. Healthy infl/palm	Avg no. Infected infl/palm	Avg no. of fallen nuts/bunch	Avg no. of nuts/bunch	% decrease over check	Green nut wt/ac (Kg)	Dry nut wt/ac (Kg)	% increase over check
Carbendazim 12%+ Mancozeb 63% @0.25%	4.27	0.81	4.73	594.27	68.95	9521.46	1238.16	80.79
Propineb @0.25%	3.13	1.00	6.60	588.73	67.37	8831.00	1148.37	67.68
Mancozeb @0.3%	3.19	1.13	7.84	537.31	52.75	7521.73	978.12	42.82
Copperoxychloride 0.3%	3.27	0.93	7.40	558.43	58.76	7813.44	1016.06	48.36
Untreated check	2.73	2.73	18.27	351.75	-	5266.47	684.85	-
S.Em±	0.15	0.12	0.17	1.54	-	1.31	0.17	-
CD @5%	0.47	0.39	0.54	4.77	-	4.03	0.52	-

**Table 2:** Per acre cost and returns of various treatments for management of Inflorescence dieback disease of arecanut (figures in Rs.)

Treatments	Yield Kg/ac	Total cost	Gross returns	Net returns	B:C ratio
Carbendazim 12%+ Mancozeb 63% @0.25%	1238.19	66144	495200	429056	1:65
Propineb @0.25%	1148.24	64980	459200	394220	1:61
Mancozeb @0.3%	978.24	64994	391200	326206	1:50
Copperoxychloride 0.3%	1016.08	64722	406400	341678	1:53
Untreated check	684.87	60414	274000	213586	1:35

### Conclusions

The present study reveals that application of combi fungicide carbendazim + mancozeb and Contact fungicide Propineb were found effective in reducing the inflorescence dieback incidence besides increase of green and dry nuts in comparison with recommended check.

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