

YIELD LOSS DUE TO FRUIT ROT (*Mahali*) DISEASE IN ARECANUT IN KERALA AND KARNATAKA

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Abstract:

This paper presents the results of a rapid field survey conducted to estimate the yield loss due to fruit rot/*mahali* disease caused by *Phytophthora meadii* in Kasaragod district of Kerala and five major arecanut-growing districts of Karnataka, i.e. Dakshina Kannada, Udupi, Chikmagalur, Shimoga and Uttara Kannada during 2018-19. These districts receive very high rainfall during monsoon season. In this report we have given the percentage incidence, the estimated yield loss and the loss in terms of rupees due to *mahali* during the current season. The management measures for the *mahali* disease (e.g. fungicidal spraying, phytosanitation practices and covering the bunches) are given in detail at the end.

Introduction:

Arecanut is an important commercial crop cultivated in India with an annual production of 0.73 million tonnes from an area of 0.44 million hectares. Karnataka, Kerala, Assam, Maharashtra, West Bengal and Tamil Nadu are the major producers. Arecanut is affected by many pests, diseases and nutritional disorders. Among the diseases, the fruit rot disease (commonly called as "*Koleroga*" or "*Mahali*"), bud rot and crown rot are the most devastating diseases in terms of yield loss and

cost involved. These diseases are caused by the fungus *Phytophthora meadii*. Fruit rot disease occurs during south west monsoon period (June - September). The disease can be identified by sudden heavy shedding of immature nuts, which lay scattered near the base of the tree. On closer observations of the nuts, dark coloured water soaked lesions are found near the perianth end. Rain plays an important role in the initiation and spread of the disease. Heavy rainfall with constant high humid conditions, wind, low temperature and intermittent bright sunshine favours the disease development. The disease causes maximum yield loss when the rainfall is heavy. The disease affected nuts lose their quality and hence have a low market value. Note that, bud rot and crown rot diseases caused by the same fungus occur either as a further manifestation of the fruit rot infection or independently as fresh infection, during the monsoon and subsequent cooler months of October-November.

Methodology:

The survey was conducted during the last week of September, 2018 in Kasaragod district of Kerala and five major arecanut growing districts of Karnataka, viz. Dakshina Kannada, Udupi, Chikmagalur, Shimoga and Uttara Kannada

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to assess the yield loss in arecanut due to *mahali*. To cover large number of gardens with limited time and resources, purposive sampling method has been used in the selected taluks of each district. To take observations, the gardens were selected systematically in each taluk. From each selected garden, 30 palms were selected at random and taken observation the percentage loss of nuts due to *mahali* per palm. Taluk wise percentage incidence of *mahali* and the average yield loss were worked out by taking average of the selected gardens in each taluk. The district average is computed by taking the average of observations taken from each district. Survey was conducted in all the major arecanut growing taluks of Kasaragod, Dakshina Kannada, Udupi, Chikmagalur, Shimoga and Uttara Kannada districts. The district wise yield loss was estimated by using the previous year's production and the estimated percentage yield loss in each district.

Results:

The results of the field survey conducted in Kasaragod district of Kerala and the five major arecanut growing districts of Karnataka



A farmer with fruit rot affected arecanuts (de-husked)

to estimate the incidence of *mahali* disease and the yield loss are discussed below.

Dakshina Kannada: Dakshina Kannada is one of the major arecanut growing districts in Karnataka. The estimated production of arecanut in this district is 78,792 tonnes from an area of 39,396 hectares. The field survey was conducted in all the 4 major arecanut growing taluks in Dakshina Kannada district. A summary of the field observations on number of gardens surveyed, and percentage yield loss due to *mahali* are given in Table 1. The estimated percentage yield loss was maximum in Bantwal (47%) followed by Belthangady (45%), Sullia (42%) and Puttur (41%). Average loss in production is estimated as 34,668 MT and loss in terms of rupees is estimated as Rs. 6,934 million.

Udupi: Udupi is another major arecanut growing district in Karnataka and the estimated production is 14,576 tonnes from an area of 7,690 hectares. The intensity of *mahali* incidence in Udupi district was comparatively very high during the year 2018. The field survey was conducted in all the three taluks in Udupi



A fruit rot affected arecanut palm

district. The average yield loss due to *mahali* is 45%. Average loss in production is estimated as 6,559 MT and loss in terms of rupees is estimated as Rs. 1,312 million.

Chikmagaluru: Chikmagaluru is a major arecanut growing area in Karnataka and the estimated production is 49,015 tonnes from an area of 36,980 hectares. The field survey was conducted in three major arecanut growing taluks *viz.*, Sringeri, Koppa and NR Pura. A summary of the field observations on number of gardens surveyed, percentage yield loss due to *mahali* are given in Table 1. The estimated percentage yield loss in Koppa, Sringeri and NR Pura Taluks are 64%, 62% and 30% respectively. Average loss in production is estimated as 25,488 MT and loss in terms of rupees is estimated as Rs. 5,098 million.

Shimoga: Shimoga is one of the major arecanut growing districts in Karnataka. The estimated production of arecanut in this district is 68,721 tonnes from an area of 48,187 hectares. The field survey was conducted in five major arecanut growing taluks in Shimoga *viz.*, Shimoga, Thirthahalli, Hosanagara, Badravathi and Sagar. A summary of the field observations on number of gardens surveyed, percentage loss of nuts due to *mahali* are given in Table 1. The results indicated that 10% yield loss in Shimoga taluk, 51% loss in Sagar taluk, 41% loss in Hosanagara taluk, 65% loss in Thirthahalli taluk and 3% loss in Badravathi taluk. Average loss in production is estimated as 23,365 MT and loss in terms of rupees is estimated as Rs. 4,673 million.

Uttara Kannada: Uttara Kannada is another major arecanut growing district in Karnataka and the estimated production is 43,260 tonnes from an area of 17,671 hectares. The field

survey was conducted in two major arecanut growing taluks *viz.* Sirsi and Siddapur. A summary of the field observations on number of gardens surveyed and percentage loss of nuts due to *mahali* are given in Table 1. The estimated percentage yield loss was maximum in Siddapur taluk (63%) followed by Sirsi taluk (54%). Average loss in production is estimated as 25,307 MT and loss in terms of rupees is estimated as Rs. 5,061 million.

Kasaragod: Kasaragod is one of the major arecanut growing districts in Kerala. The estimated production of arecanut in this district is 51,807 tonnes from an area of 19,478 hectares. The field survey was conducted in 4 taluks in Kasaragod. A summary of the field observations on number of gardens surveyed, percentage loss of nuts due to *mahali* are given in Table 1. The results indicated that 46% yield loss in Kasaragod taluk, 40% loss in Manjeshwar taluk, 59% loss in Hosdurg taluk and 36% in Vellarikundu Taluk. Average loss in production is estimated as 23,313 MT and loss in terms of rupees is estimated as Rs. 4,663 million.

The high incidence of *mahali* occurred in 2018 is due to the continuous and heavy showers experienced during the monsoon. The farmers could not get enough time gap to undertake proper spraying operation to control *mahali*. This resulted in a heavy loss of the produce to the farmers.

The incidence of bud rot and crown rot diseases are comparatively high in gardens with high incidence of fruit rot disease. Symptoms of bud rot appear as yellowing of spindle leaf and rotting of the growing bud and surrounding tissues. Such plants emit a foul smell and the spindle can be easily pulled out. Finally the

Table 1. Incidence of *mahali* disease and yield loss (*Chali* equivalent) in 5 districts of Karnataka and Kasaragod district of Kerala

District	Taluk (surveyed)	Area (Ha)	Production (Tonnes)	No. of gardens surveyed	Yield loss (%)	Loss in production (MT)	Loss* (Rs in Million)
Dakshina Kannada	Bantwal	6230	12460	35	47	5856	1171
	Sullia	11389	22778	40	42	9567	1913
	Belthangady	8036	16072	36	45	7232	1446
	Puttur	9966	19932	30	41	8172	1634
	Total	39396	78792	141	44	34668	6934
Udupi	Total	7690	14576	50	45	6559	1312
Shimoga	Thirthahalli	8107	12161	31	65	7905	1581
	Shivamoga	9720	14580	30	10	1458	292
	Sagar	4890	7824	30	51	3990	798
	Hosanagara	3660	5490	30	41	2251	450
	Badravathi	14296	17870	30	3	536	107
	Total	48187	68721	151	34	23365	4673
Chikmagalur	Sringeri	2490	1624	30	62	1007	201
	Koppa	4800	4128	33	64	2642	528
	NR Pura	2364	3133	30	30	940	188
	Total	36980	49015	93	52	25488	5098
Uttara Kannada	Sirsi	5584	13960	30	54	7538	1508
	Siddapur	3998	9595	32	63	6045	1209
	Total	17671	43260	62	59	25307	5061
Kasaragod	Total	19478	51807	54	45	23313	4663

*Loss is calculated by considering the price of Rs.200/kg

crown remains without the spindle for some period of time before the tree dries totally. Crown rot symptoms initiate from the outermost leaf sheath, the outer most leaves become yellow and droop. The infection gradually spread towards the growing bud. In the advanced stages, all the leaves fall off with only the spindle remaining in the tree. In both

the diseases, if the infections at the early stages are not treated the palms die.

Management measures to be adopted:

1. *Mahali* can be managed by spraying 1% Bordeaux mixture to the bunches at least two times at an interval of 45 days. The first spray should be given immediately after

the first few showers and if the monsoon prolongs a third spray should be compulsorily given. It is very important to make a proper 1% Bordeaux mixture (1 kg Lime + 1 kg Copper Sulphate in 100 litres water) and spray it freshly. It is to be noted that addition of excess lime will reduce the efficacy of the mixture, while excess Copper Sulphate will be 'phytotoxic' to the nuts.

2. Phytosanitary measures like collection of fallen nuts, removal of infected bunches and other plant parts from the garden and destroying them, preferably outside the garden, will give better management of the disease. Proper drainage in the gardens especially those which are in low lying and water logged conditions will reduce the disease incidence.
3. Covering bunches with polythene bags of size 85 X 75 cm and 200 gauge thickness, before the onset of monsoon gives complete control of *mahali* disease. If timely

and proper management measures are not adopted, the disease causes heavy loss in yield and sometimes a total loss of the crop.

4. In areas where *mahali* infection is high, there is possibility of higher infection of palms to cause bud and crown rot. Therefore, preventive measures have to be taken up for controlling these diseases also. Bud rot/ crown rot diseases can be effectively managed by removing the infected tissues and treating the wound with 10% Bordeaux paste. To prevent the spread of infection, spray 1% Bordeaux mixture to the crown of the affected and surrounding trees.

It is necessary to make the farmers aware of the phytosanitary measures to be taken and proper preparation/spraying of Bordeaux mixture for control of the disease so that inoculum in the garden is reduced. This will ensure control of the disease.

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