NEW RECORD OF *COCHLIOBOS HAWAIIENSIS* ALCORN ASSOCIATED WITH BUTTON SHEDDING AND PREMATURE NUTFALL IN COCONUT IN INDIA

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SUMMARY

From the shed buttons and immature nuts of coconut, a jungus was isolated which on artificial inoculation in coconut bunches of varying ages caused button shedding and premature nutfall. The fungus was identified as *Cochliobolus hawaiiensis* Alcorn. Buttons up to 4 months age were susceptible to the fungus. Among the thirteen coconut genotypes studied, infection was high in Lakshadweep Micro, Lakshadweep Ordinary an d East Coast Tall x Malaysian Green Dwarf (ECT x MGD). Carboxin 75 WP (500 ppm and above), mancozeb and copper oxy chloride (1000 ppm and above) completely inhibited the mycelial growth of *C hawaiiensis* under in vitro conditions. *In Vivo*, mancozeb (0.2%) was very effective for the control of the disease.

INTRODUCTION

Button shedding and premature nutfall in coconut (Cocos *nucifera* L. is caused by several factors viz. genetic variability, physiological or environmental conditions, fertilization, excessive soil moisture and drought, nutritional deficiency, diseases and pests (Sudhakara, 1990).

Fungi as one of the major causes of button shedding has been reported by many workers. Mac Donald (l924) observed in Kenya that the falling of buttons and nuts was due to infection of flowers with *Colletotrichum* sp which caused gumming of tissues at the point of their attachment va'th the inflorescence. Simmods (l924) found that shedding of buttons was associated with the infestation of the fungus *Botryodiplodia.* The fungus *Phytophthora* sp as the cause of button shedding has been reported from Sri Lanka (Gadd, 1922) and India (Sunderaraman and Ramakrishnan, 1924). Diseases caused by *Phytophthora palmivora* (Sunderaraman and Krishnaswami, 1933), *Botryosphaeria rhodina* (SuRathmath and Shantappa, 1979), *Ganoderma lucidum* (Bhaskaran et al., 1989) and *G. boninense* (Ohler, 1984) also cause button shedding in coconut. *Aspergillus, Penicillium Phytophthora, Fusarium, Choanepheora cucurbitarum* and *Pestalotia* have also been reported to be associated with button shedding (Anonymous, 1988). In the present paper, button shedding caused by *Cochliobolus hawaiiensis* Alcorn., a new record of this fungus on coconut is reported.

MATERIALS AND METHODS

A study was conducted at the Coconut Research Station, Veppankulam to assess the extent of button shedding and premature nutfall and nuts to infection by the pathogen(s). Total number of buttons in each bunch after one month of spathe opening was counted for six consecutive months in each tree and number of buttons and immature nuts shed due to fungal infection were counted every month. Fresh shed buttons and immature nuts from different genotypes were collected, examined under the microscope and isolations were made in potato dextrose agar medium to assess the extent of pathological causes of button shedding.

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Seven fungicides, viz., carbendazim, carboxmi, tridemorph, copper oxy chloride, Bordeaux mixture, mancozeb and ziram at three different concentrations were tested under *in vitro* conditions for their efficacy against C *hawahensis,* the pathogen causing shedding and premature nutfall in coconut. The effective fungicides were tested under field conditions in ECT coconut palms for the control of the diseases.

RESULTS AND DISCUSSION

Button shedding due to fungal infection was high in the genotypes Lakshadweep Micro (LM), Laksahdweep Ordinary (LO) and ECT x Malayan Green Dwarf Buttons up to 4 months age alone are infected by fungi and there was no button shedding due to fungal infection after 4th month (Table 1).

Fungi Associated

Three fungal isolates *viz., Aspergillus sp., Penicillium* sp., and a graminicolus funtms were consistently obtained from shed buttons and immature nuts. On articificial inoculation, *Aspergillus* sp and *Penicillium* sp failed to infect either the shed buttons or inunature nuts and buttons in coconut bunches. The granunicolus fungus was identified as *Cochhobolus hawahensis Alcom.* by International Mycological Institute, Kew, Surrey (IMI) 354567). *(C. hawahensis Alcom.* has been recorded for the first time in India in coconut). Buttons and immature nuts of l to 4 months old of ECT variety were artificially inoculated vrith the fungus in the stalk end. The growth of fungus was observed within 5 days after inoculation and an area of about, 3-4 cm radius around the point of inoculation was covered by the fungus within 20 days after inoculation resulting in shedding of buttons and immature nuts from l0th to 25th day after inoculation depending upon the age of the buttons.

Control

Mancozeb and copper oxy chloride at 1000, 2000 and 3000 ppm and carboxin at 500, 1000 and 2000 ppm concentrations completely inhibited the growth of *C hawahensis* under in *vitro* conditions. Ziram at 3000 ppm concentration gave 66.5% inhibition. Under field condition mancozeb at 0.2% concentration gave 74.2% reduction in the disease incidence followed by carboxin (56.5%) and copper oxy chloride (48.4%) when compared to control (Table 2).

CONCLUSION

Pathological causes of button shedding assume significant proportions during the recent years. *C. hawaiiensis* has been isolated for the first time from coconut and its role in button shedding and pre-mature nutfall in coconut was established. Fungicide spray at the correct time will help to reduce loss caused by the fungi.

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Table 1: Incidence of button shedding and premature nutfall in different Coconut genotypes due to fungal infection

Genotypes	Age of buttons (months)					
	No. of shed buttons/palms 6 mos	1	2	3 %	4	Total
ECT	90	20.00* (26.17)	12.00 (20.10)	8.00 (16.23)	1.78 (7.49)	41.78
WCT	80	20.00 (26.32)	15.00 (22.74)	5.00 (12.79)	0.00 (14.54)	40.00
LO	88	18.18 (25.19)	27.27 (31.46)	9.10 (17.50)	0.00 (14.54)	54.55
LM	176	45.45 (42.38)	22.73 (28.43)	11.36 (19.61)	0.00 (14.54)	79.54
Zanzibar	40	20.00 (26.45)	0.00 (14.54)	0.00 (14.54)	0.00 (14.54)	20.00
ECT X MGD	72	27.78 (31.76)	11.11 (19.27)	3.33 (10.45)	1.11 (5.89)	43.33
ECT X MYD	64	25.00 (29.95)	6.25 (14.40)	3.75 (11.11)	1.25 (6.19)	36.25
WCT X COD	100	28.00 (31.91)	0.00 (14.54)	0.80 (5.11)	0.00 (14.54)	28.80
LM X MGD	112	25.00 (30.00)	14.29 (22.14)	0.00 (14.54)	0.00 (14.54)	39.29
ECT X Ay	100	12.00 (20.14)	8.00 (16.28)	0.00 (14.54)	12.00 (19.92)	32.00
Ay X COD	96	16.64 (24.07)	25.00 (29.95)	0.00 (14.54)	0.00 (14.54)	41.67
Cochin China X Philippines	52	23.08 (28.61)	0.00 (14.54)	0.00 (14.54)	0.00 (14.54)	23.08
C.D. (P = 0.05)	7.46	3.16	2.39	1.66	2.05	

LEGEND

ECT – East Coast Tall
WCT – West Coast Tall
LO – Lakshadweep Ordinary
LM – Lakshadweep Micro
MGD – Malaysian Green Dwarf
MYD – Malaysian Yellow Dwarf
COD – Chowgat Orange Dwarf
Ay - Ayiramkachi

- - Percent shed buttons due to fungal infection

Data in parenthesis are aresin transformed values.

Table 2: Efficacy of fungicides against C. hawaiiensis under *in vitro* conditions

	Concentration (ppm) Diameter	Colony Inhibition	Percent Over control
Carbendazim 50WP	500	4.60	40.00
	1000	4.33	43.6
	2000	3.40	55.7
Bordeaux mixture	5000	4.77	37.8
	7500	4.60	40.0
	1000	4.00	47.9
Tridemorph 80 EC	1000	4.26	44.5
	2000	3.23	57.9
	3000	3.03	60.5
Mancozeb 45 WP	1000	0.00	100.0
	2000	0.00	100.0
	3000	0.00	100.0
Carboxin 75 WP	500	0.00	100.0
	1000	0.00	100.0
	2000	0.00	100.0
Copper oxychloride 50 WP	1000	0.00	100.0
	2000	0.00	100.0
	3000	0.00	100.0
Ziram 27 SC	1000	3.60	53.1
	2000	3.00	60.9
	3000	2.57	66.5
Control	-	7.67	-
C.D (P = 0.05)		0.16	

Table 2a: Efficacy of fungicides against C. hawaiiensis under *in vivo* conditions

Carbendazim 75 WP	0.1	5.4	56.5
Copper oxy chloride 50 WP	0.3	6.4	48.4
Mancozeb 45 WP	0.2	3.2	74.2
Ziram 27 SC	0.3	8.6	30.7
Control	-	12.4	-
C.D (P = 0.05)		3.5	