Journal of Plantation Crops 24 (Supplement) : 149-152 (1996)

STUDIES ON THE VIRULENCE OF DIFFERENT ISOLATES OF *THIELAVIOPSIS PARADOXA* ON COCONUT*

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ABSTRACT

The virulence of twelve isolates of *Thielaviopsis paradoxa*, the causal agent of stem bleeding disease of coconut collected from different locations in Kerala, Karnataka and West Bengal, were tested on detached petioles of West Coast Tall (WCT) palms using bore hole method of inoculation. The lesion size recorded after 15 days of incubation at 24 ± 2°C varied from 26.8 - 55.55 cm^2. Kudlu isolate (Kasargod-I) showed maximum lesion size and the minimum lesion size with Mohitnagar isolate (W. B). In a comparative study on virulence of six isolates on WCT stem, lesion size ranged from 9.72 - 31.4 cm^2 after two months of inoculation. Kudlu isolate (Kasargod-I) produced maximum lesion size of 31.4 cm^2 while Adoor isolate produced the smallest lesion of 9.72 cm^2. The results indicated that Kudlu isolate (Kasargod-I) was the most virulent isolate of *T. paradoxa*

INTRODUCTION

Stem bleeding disease of coconut associated with *Thielaviopsis paradoxa* (de Seynes) Hohnel is widely prevalent in all coconut growing states in India. The pathogenicity of *T. paradoxa* in causing stem bleeding disease in coconut has been established (Nambiar *et al.*, 1986). Earlier, cultural characters on different culture media and growth requirements of *T. paradoxa* isolates from Kerala and Karnataka were studied (Nishita Naik, 1990 Gowda and Nambiar, 1992). However, information on the virulence of different isolates on coconut was lacking. Hence, the present investigation was undertaken to study the virulence of twelve isolates of *T. paradoxa* collected from different locations on detached coconut leaf petioles. In addition, studies on the virulence of six selected isolates was tested on the stems of healthy WCT palms in order to establish the relation between the virulence on petioles and stems. This would help in identifying a virulent isolate and also in standardisation of screening methodology to screen coconut germplasm for their reaction to *T. paradoxa*.

MATERIALS AND METHODS

Twelve isolates of *T. paradoxa* were isolated from the stem bleeding affected coconut samples collected from Kerala, Karnataka and West Bengal states. Of the Twelve, six were from Kerala (Kasargod-I, Shiria, Adoor, Kayamkulam, Kasargod-II and Kozhikode), five were from Karnataka (Vittal, Mangalore, Kadur, Sagar and Hirehalli). and one from West Bengal (Mohitnagar).

Virulence on petiole: The virulence of all the twelve isolates was tested on detached petioles using bore hole method of inoculation (Usman and Nambiar, 1992). Fresh coconut leaf petioles in the lower whorls of WCT palms (25-30 years) were collected and cut into pieces of 30cm length. The cut ends were smeared with petroleum jelly to check water loss. A bore hole (0.5 cm dia) was made at the centre of the petiole

* *CPCRI Contribution No.898*

with a sterilized cork borer. Seven day old *T. paradoxa* inoculum grown on cocount rachis bits (0.5cm length) was inserted into the hole and covered with sterile wet cotton pads. The inoculated petiole bits kept in fresh polythene bags were incubated at 24 ± 2°C for 15 days. The lesion size was recorded after 15 days of split opening of petiole bits. For each isolate twelve replications were maintained and the inoculation was carried out once in March-April and again during July-August.

Test for virulence on the stems of healthy palms: In order to establish the relation between virulence on petiole and virulence on stem, studies on the virulence of six selected isolates were carried out on the stems of WCT palms. The six isolates used were KSD-I, Shiria, Kadur, Mohitnagar, KSD-II and Adoor and these isolates were tested on 12 healthy WCT palms (25-30 years) using the method described by Nambiar *et. al.* (1986). The inoculation was carried out during July and lesion size was recorded after two months. Six replications were maintained for each isolate and the inoculation was done at 0.25, 0.5 and 1.0 M heights.

RESULTS

Virulence on petioles: All the twelve isolates produced characteristic reddish brown circular to elleptic lesions in the petiole after 15 days of inoculation. The lesion size produced by different isolates (Table I) varied from 26.8 to 55.5 cm^2. The biggest lesion was caused by KSD-I (Kudlu) isolate (55.5 cm^2) followed by Shiria isolate (50.5 cm^2) and the smallest lesion size was noticed with Mohitnagar isolate (26.8 cm^2).

Virulence on the stems of healthy palms: The observations on the size of the lesion caused by

Table I. Lesion on detached petioles of WCT palms caused by the twelve isolates of *T. paradoxa*.

Sl. No.	Isolate	Lesion size* (cm^2)
01.	Kasargod-I (Kudlu)	55.5
02.	Shiria	50.5
03.	Kadur	42.4
04.	Mangalore	41.8
05.	Kozhikode	40.7
06.	Kayamkulam	40.3
07.	Vittal	39.2
08.	Sagar	37.4
09.	Kasargod-II (Hill Campus)	32.0
10.	Adoor	30.0
11.	Hirehalli	29.4
12.	Mohitnagar	26.8
	S.E. Plot	11.24
	Gen Mean	38.83
	C.V.	28.93
	AV.C.D. (p = 0.05)	8.99

* Mean of 12 palms recorded after 15 days of incubation at 24 ± 2°C.

six isolates are presented in the Table II. The lesion size varied from 9.71 to 31.37 cm^2, maximum lesion size was seen with KSD-I (Kudlu) isolate (31.37 cm^2) followed by Shiria (29.13 cm^2). Adoor, KSD-II and Mohitnagar isolates produced small lesions (9.7, 10.2 and 12.0 cm^2 respectively) and were on par. The depth of the lesion caused by six isolates varied from 1.0 - 1.5 cm.

DISCUSSION

Based on the virulence on petiole the twelve isolates of *T. paradoxa* can be grouped into three categories. The first group comprises of KSD-I and Shiria isolates that showed highest virulence as expressed by the lesion (55.5 and 50.0 cm^2). The second group consisted of Kadur, Mangalore, Kozhikode, Kayangulam and Sagar isolates that showed middle order virulence of 37.4 to 42.4 cm^2 lesion area. The third group consisted of Mohitnagar, Hirehalli, Adoor and KSD-II with a lesion area ranging from 26.8 to 32.0 cm^2. The results from both petiole and stem inoculation indicated that KSD-I (Kudlu) and Shiria isolates showed significantly higher lesion sizes indicating higher virulence. These two isolates can be used for screening germplasm against *T. paradoxa*. The trend in the virulence of isolates observed in the detached petiole inoculation method was found to be similar to the stem inoculation method. Hence petiole inoculation method can be used for screening germplasm against *T. paradoxa*. Though Mohitnagar isolate was found to be less virulent in the inoculation tests, the disease used to appear in severe form in the CPCRI Farm at Mohitnagar and neighbouring gardens. This might be due to the prevailing environmental conditions in the region. The spread of the disease in the infected palms appears to be hastened during cooler months resulting in severe decay of tissues in deeper layers. Hence, the environmental conditions should be taken into consideration to properly assess the virulence/reactions.

Table II. Lesions on the stems of WCT palms caused by the twelve isolates of *T. paradoxa*.

Sl.No.	Isolate	Lesion size* (cm^2)
01.	Kasargod-I (Kudlu)	31.40
02.	Shiria	29.13
03.	Kadur	21.87
04.	Mohitnagar	12.05
05.	Kasargod-II (Hill Campus)	10.15
06.	Adoor	9.72
	S.E. Plot	5.31
	Gen Mean	19.05
	C.V.	27.89
	AV.C.D. (p = 0.05)	6.26

* Mean of six palms recorded after 2 months.

ACKNOWLEDGEMENT

The authors are thankful to the Director, CPCRI, Kasargod, for providing necessary facilities for the study.

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