Vegetable Science (2012) 39 (2) : 195-197

Occurrence of unreported fruit rot caused by *Fusarium chlamydosporum* on *Capsicum annum* in Bay Island, India

Krishna Kumar, S Bhagat, K Madhuri, Ajanta Birha and RC Srivastava

Received : February, 2012 / Accepted : August, 2012

Chilli, *Capsicum annum* L. is one of the important cash crops in India. Its cultivation has existed for several hundred years as a sustainable form of agriculture in India and in many other countries. It is an annual herbaceous vegetable and spice grown in both tropical and sub-tropical regions. (www.chilli.in/origin of_chilli.htm). India is the largest producer and consumer of chillies in the world with a contribution of nearly 25 percent of the global output. The average production in India is estimated to be around slightly above one million tons per year.

Andaman and Nicobar Islands represents one of the most fragile humid tropical ecosystem with mean rainfall of about 3180mm per annum. The average mean temperature varies from 23 to 30 ^{0}C with 80-90 percent relative humidity during the rainy season. Most of the diseases thrive best under this climate. The sustainability of chilli crop is threatened by a number of factors. Main biotic stresses such as bacterial wilt, Fusarium wilt, anthracnose, viruses and several insect-pests have been reported to impair the crop productivity (Isaac 1992; Pramanik *et al.* 2004). Among these diseases, Fusarium wilt is one of the most devastating diseases of chilli in these Islands.

During a systematic surveys of South Andaman district, Andaman and Nicobar Islands, India in 2009 a characteristic fruit rot symptom was observed on chilli fruit. The disease incidence was recorded to be 20-22% in chilli fruits. Infected fruit showed dark brown spot of irregular shape and enlarged gradually measured up to 1-2 cm in dia. (Fig. 1a). Diagnostic symptoms were surface disinfected for 2 min in 2% NaOCl, plated on potato dextrose agar (PDA) and incubated at 28±2°C. Single spore cultures from these colonies were grown on PDA to assist species identification. The colony in PDA showed orangish white puffy mycelium and in the reverse of the plate had orange pigmentation (Fig. 1b, c). Both macroconidia and microconidia were observed which are hyaline in colour. Microconidia were abundant, aseptate or 1- septate, spindle-shaped measuring from 10–26× 2.5 – 4 ìm and macroconidia were 3-5 septate, sickle-shaped, measuring from 30–37.5 ×3 – 5 µm. Chlymydospores were hyaline, globose, thick-walled, single celled and were produced either singly or in pairs. (Fig. 1d, e) under microscopic examination. The fungus was identified on the basis of their macro- and micro-morphology and cultural features by described Nelson *et al.* (1983) and Wollenweber (1931)(Table 1).

Pathogenicity was carried out *in vitro* on healthy fruit of *Capsicum annum L.,* according to method developed by Melanie *et al.* (2004) with a slight modification. Koch's postulates were accomplished for test isolates by wounding approximately 1mm deep using sterile sharp pointed tooth stick. Ten microliters of conidia suspension (10^8 conidia /ml) was inoculated into the wounded site of the plant part using sterile fine-syringe needle. The inoculated organs were placed into the moisturized filter paper-layered petri plates. Healthy plants sprayed with water were served as control. Plates were incubated at room temperature in the laboratory for 1 week and the symptom developed was observed. After a period of one week the inoculated plants showed similar symptoms and the causal fungus was re-isolated from fruit lesions. (Fig.1f). No symptoms were observed on uninoculated fruit sprayed with water.

Total genomic DNA was extracted and purified according to the method adopted by Bernstein *et al*. (1995). The *Fusarium* isolate was further characterized by nucleotide sequence analysis. For this, the internal transcribed spacer (ITS) regions was amplified with the universal primers ITS1 and ITS4 (White *et al*. 1990), sequenced, and submitted to NCBI GenBank (Accession No.

Krishna Kumar, S Bhagat, K Madhuri, Ajanta Birha and RC Srivastava
Division of Field Crops, Central Agricultural Research Institute, Port Blair 744 105, Andaman and Nicobar Islands, India.
Email: krishnaksingh2000@yahoo.co.in

Table 1. Morphological characteristics of *Fusarium* sp (FCC1) from chilli fruit

Characteristic	Shape		Size (µm)	
	F. chlamydo-sporum Wollenweber & Reinking (1931)	*F. chlamydo-sporum* -FCC1	*F. chlamydosporum* Wollenweber & Reinking (1931)	*F. chlamydo-Sporum*-FCC1
Colony colour	Colonies woolly, initially white, becoming pink to red to brown central in PFA medium	Orangish white puffy mycelium in PDA medium	-	-
Microconidia	Spindle-shaped	Spindle-shaped	6– 26 x 2– 4 µm	10–26× 2.5 – 4 µm
Macroconidia	Sickle-shaped	Sickle-shaped	30–38 x 3– 4.5 µm	30–37.5 ×3 – 5 µm
Septation in conidia	-	-	0-5 septate	0-5 septate
Conidia colour	Hyaline	Hyaline	-	-
Chlymydospores	Globose, thick-walled	Globose, thick-walled	-	-

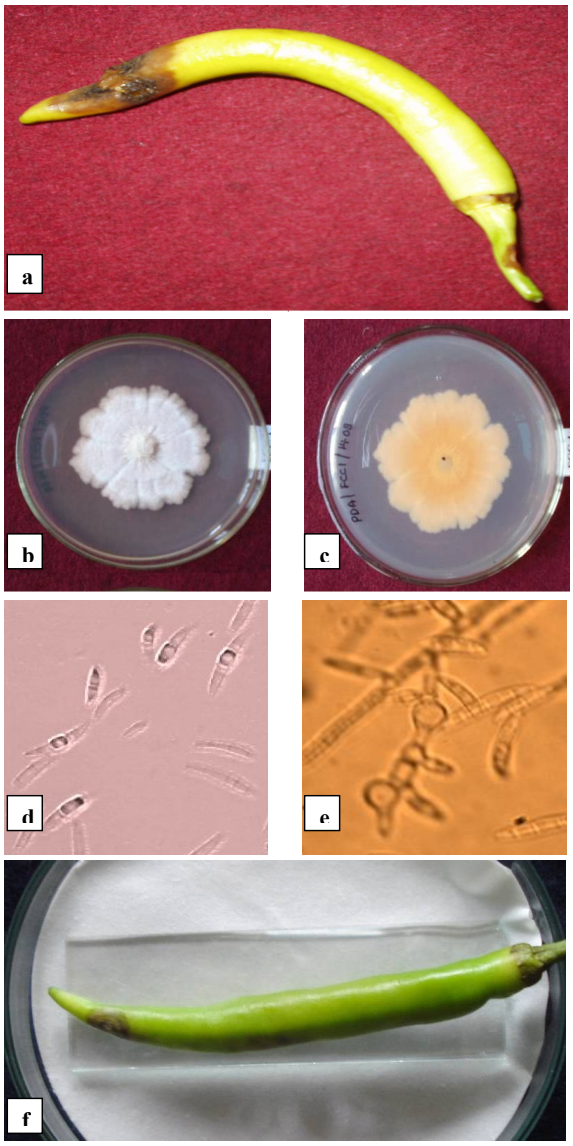

Fig1. (a) Symptoms of fruit rot on chilli fruit (b&c) Colony after 10 days of incubation on PDA (d) Macro-and microconida of *F. chlamydosporum* obtained from the sporulated colonies of PDA plate (e) Chlymydospores produced in PDA (f) Symptoms appearing on inoculated fruit for Pathogenicity test

GU222377). The nucleotide sequence of rDNA ITS region showed 95% similarity with *Fusrium chlamydosporum* (Wollenw. & Reink) reported in the NCBI database. Based on morphological, cultural and molecular characteristics the fungus was identified as *F. chlamydosporum* as described by Wollenweber (1931) and Nelson *et al.* (1983). *F. chlamydosporum* have been reported to cause on black cotton soil, rhizosphere of pigeon pea, *Arahis hypogaea* (Subramaniam, 1957; Agnihothurudu, 1959; Srivastava *et al.* 1974) and *Coleus forskohlii* (Shyla 1998). A *Fusrium* rot of *Capsicum annum* L. caused by *F. chlamydosporum* was reported for the first time from Andaman & Nicobar, India (Bilgrami *et al.* 1991; Jamaluddin *et al.* 2004). To the best of our knowledge, this is a new host for *Capsicum annum* L.

References

Agnihothurudu V (1959) Fungi isolated from rhizosphere. V J Madras Univ 29: 155-181.

Bernstein B, Zehr EI, Dean RA and Shabi E (1995). Characteristic of *Colletotrichum* from peach, Apple, Pecan and other host. Pl Dis 79: 478-482.

Bilgrami KS, Jamaluddin S and Rizwi MA (1991) Fungi of India. Today & Tomorrow's Printers and Publishers, New Delhi, India.

Isaac S (1992) Fungal Plant Interaction. Chapman and Hall Press, London, p115.

Jamaluddin S, Bilgrami KS and Ojha BM (2004) Fungi of India (1989-2001). Scientific Publishers, Jodhpur, India.

Melanie L, Ivey L, Nava-Diaz C and Miller SA (2004) Identification and management of *Colletotriochum acutatum* on immature bell peppers. Pl Dis 88: 1198-1204.

Nelson PE, Toussoun TA and Marasas WFO (1983) *Fusarium* species. An Illustrated Manual for Identification. Pennsylvania State University Press, University Park.

Pramanik, SC, Ganesh Kumar B, Shakila Nawaz, Sajibala B and Mukherjee HN (2004) Location specific strategies for increasing vegetable production in Bay Islands. Agricultural Situation in India. LX (12): 771-774.

Subramaniam CV (1957) *Fusaria* associated from South Indian soils. Nature London 168: 561.

Srivastava SN and Saksena HK (1974) Fungi associated with groundnut pods and seeds, their nature and control. Ind J Farm Sci 2: 56-62.

Shyla M (1998) Etiology and management of root rot of *Coleus forskohlii*. M Sc thesis submitted to University of Agricultural Science, Bangalore, India.

White TJ, Bruns T, Lee S and Taylor J (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: Innis MA, Gelfand DH, Sninsky JJ (ed), PCR Protocols: a Guide to Methods and Applications, pp 315-322.

Wollenweber HW (1931) "*Fusarium*-Monographie. Fungi parasitici et saprophytici." (*Fusarium* monograph. Parasitic and saprobic fungi) in Zeitschrift für Parasitenkunde pp 3:3 269 – 516.