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CULTURAL AND MORPHOLOGICAL VARIABILITY IN *COLLETOTRICHUM CAPSICI* CAUSING FRUIT ROT OF CHILLI

D.M. Gayakwad[1]* and Rajesh R. Waghunde[2]

[1]Department of Plant Pathology, N.M. College of Agriculture, Navsari Agricultural University, Navsari - 396 450, Gujarat, India.
[2]Department of Plant Pathology, College of Agriculture Bharuch, Navsari Agricultural University, Bharuch-392 012, Gujarat, India.
*Corresponding author E-mail : dipikagayakwad732@gmail.com

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ABSTRACT

Fruit rot of chilli, incited by *Colletotrichum capsici* is a major concern for the farmers in various parts of country. An experiment was undertaken to study the cultural and morphological variability in *C. capsici* causing fruit rot of chilli. The results revealed that morphological characters of *Colletotrichum* isolates were studied seven days after incubation. The mycelium was septate, hyaline and producing conidia and asexual fruiting body acervuli containg black, long stiff pointed setae average size (102.920 × 3.967 µm) and present of 3-4 septa. The conidia were hyaline, cylindrical shape with single oil globules at the centre and the average size of conidia (25.387 × 3.727 µm). Among four isolates of *C. capsici*, the colony colour varied from brown black and white observed in BbCc1, AmCc2 and BhCc3 and white colony color observed ChCc4. All the isolates were found excellent sporulation. The colonies mostly had profuse mycelial growth with regular and irregular margin. Regular margins were observed in two isolates *viz.*, BbCc1 and BhCc3 while irregular margins were observed in AmCc2 and ChCc4 isolates. The maximum radial mycelial growth (85 mm) was observed in AmCc2 and BhCc3 while 80 mm in BbCc1 and ChCc4. AmCc2 and ChCc4 isolate colonies had profuse mycelial growth, whereas ChCc4 colonies has white upper surface while reverse surface appeared black in colour.

Key words : *Colletotrichum capsici*, Morphology, Chilli isolates.

Introduction

Chilli (*Capsicum annum* L.) is an important spice cum vegetable crop, known as *Capsicum*, hot pepper, marcha, lal mirch, mirchi, sweet pepper or paparika. Chilli belongs to family *Solanaceae* which is native of tropical America. It is an annual herbaceous vegetable and spice grown in both tropical and sub-tropical regions (Hunziker, 2001). *Capsicum* contains approximately 20-27 species, of which five *viz.*, *C. annuum*, *C. baccatum*, *C. chinese*, *C. frutescens* and *C. pubescens* are domesticated in different parts of the world (Tong and Bosland, 1999). The sustainability of chilli-based agriculture is threatened by a number of factors. The biotic stresses such as bacterial wilt, fruit rot, anthracnose, leaf curl virus disease, root-knot nematodes diseases and several insect pests have been reported to impair the crop productivity (Isaac, 1992). The important diseases are fruit rot (*Colletotrichum capsici* (Syd.) Butler and Bisby), damping off (*Pythium aphanidermatum* (Edson) Fitz), powdery mildew (*Leveillula taurica* (Lev.) Arn.), bacterial leaf spot (*Xanthomonas campestris* pv. *vesicatoria* (Doidge) Dye), Cercospora leaf spot (*Cercospora capsici* Cooke), leaf curl (*Chilli leaf curl virus*), root knot (*Meloidogyne* sp.) and dry root rot (*Rhizoctonia solani* Kuhn). Among these diseases fruit rot or anthracnose or die-back caused by *Colletotrichum capsici* (Sydow) Butler and Bisby is one of the most destructive diseases of chilli in India (Ramchandran *et al*., 2007). The symptom appears on fruits initially small circular spots appeared on the skin of the fruit. The spots were sunken and light grey coloured with black margin, fruiting bodies *viz.*, acervuli were produced on the infected area. The seed borne nature of *C. capsici* may be transmitted from mother plant, which were present

throughout the storage period, which cause severe seed rot, seedling decay, twig blight, fruit rot and affect the seed germination of chilli and able to survive up to the next crop season in the infected seeds. It has been reported that a part of post harvest losses of fruit quality deterioration of chilli is due to anthracnose ranges from 21 – 47 per cent. Anthracnose caused loss of 31 per cent in green fruits and 46 per cent in red ripe fruits ascorbic acid after 14 days of pathogenesis as well as 25 per cent loss of capsaicin content.

Materials and Methods

Collection of disease sample

The disease samples of fruit rot of chilli were collected from different geographical areas of Bharuch and Ankleshwar taluka of South Gujarat. Four isolates of *Colletotrichum capsici* causing diseases in chilli were collected from Borbhatha, Amleshwar, Bhadbhut and Chapra villages of Bharuch district of South Gujarat.

Morphological variability

Seven days old *Colletotrichum* culture grown on PDA plates was used to study the morphological characters like width of conidia, size of conidia and number of transverse as well as longitudinal septa and beak length. The size of conidial width was measured under light microscope at 40X. Ten observations of each conidium was recorded for conidial measurement, beak length, number of transverse as well as longitudinal septa and mean values were calculated.

Cultural variability

The cultural characters of *Colletotrichum* were recorded from the culture grown on PDA. Twenty ml of sterilized PDA was poured in Petri plates. Five mm disc was cut through sterilize cork borer from the seven days old fungal culture grown in Petri plates. One disc was placed in the center of each plate and was incubated at 27 ± 1ºC for seven days. The differences between observations regarding colony color, sporulation, type of margin, radial growth and type of colony growth of four isolates were recorded 7 days after inoculation.

Results and Discussion

Morphological variability

Seven days old *Colletotrichum* culture grown on PDA plates was used to study the morphological characters like width of conidia, size of conidia and number of transverse as well as longitudinal septa and beak length. The mycelium was septate, hyaline and producing conidia and asexual fruiting body acervuli containg black, long stiff pointed setae average size (102.920 × 3.967 µm) and present of 3-4 septa. The conidia are hyaline, cylindrical shape with single oil globules at the centre and the average size of conidia (25.387 × 3.727 µm) (Fig. 1).

Cultural variability

The cultural characters of *Colletotrichum* were recorded from the culture grown on PDA. The differences between observations regarding colony color, sporulation, type of margin, radial growth and type of colony growth of four isolates were recorded 7 days after incubation. The data is presented in Table 3 and depicted in Fig. 2. Among four isolates of *C. capsici*, the colony colour varied from brown black and white observed BbCc1, AmCc2 and BhCc3 and white colony color observed ChCc4. All the isolates were found excellent sporulation (+ + + +). The mostly the colonies had profuse mycelial growth with regular and irregular margin. Regular margins were observed in two isolates *viz*., BbCc1 and BhCc3. Irregular margins were observed in AmCc2 and ChCc4 isolates. The maximum radial mycelial growth (85.00 mm) was observed in isolates AmCc2, BhCc3 while 80.00 mm in BbCc1 and ChCc4. Isolates BbCc1 and ChCc4 possesses concentric rings with uniform growth, white patches in the centre. Isolates AmCc2 and ChCc4 colonies had profuse mycelial growth, whereas, ChCc4 colonies the upper surface of white in colour while reverse

Table 1 : Collection of pathogens (*Colletotrichum capsici*) from Bharuch district.

S. no.	Village	Taluka	Isolation source	Isolates name
1	Bhadbhut	Bharuch	Ripe chilli fruit	BbCc1
2	Amaleshwar	Bharuch	Unripe chilli fruit	AmCc2
3	Borbhatha	Bharuch	Unripe chilli fruit	BhCc3
4	Chapra	Ankleshwar	Unripe chilli fruit	ChCc4

Table 2 : Scale used for recording sporulation data (Dasgupta, 1981).

S. no.	Grade	Description	Av. No of conidia / Microscopic field
1	—	No sporulation	—
2	+	Poor	1-10
3	+ +	Fair / Moderate	11-30
4	+ + +	Good	31-50
5	+ + + +	Excellent	>51

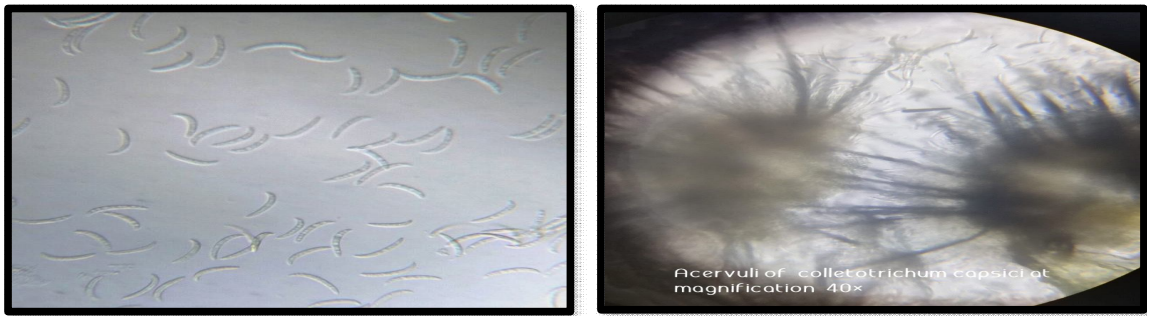

Fig. 1 : Microscopic photographs of *Colletotrichum capsici*.

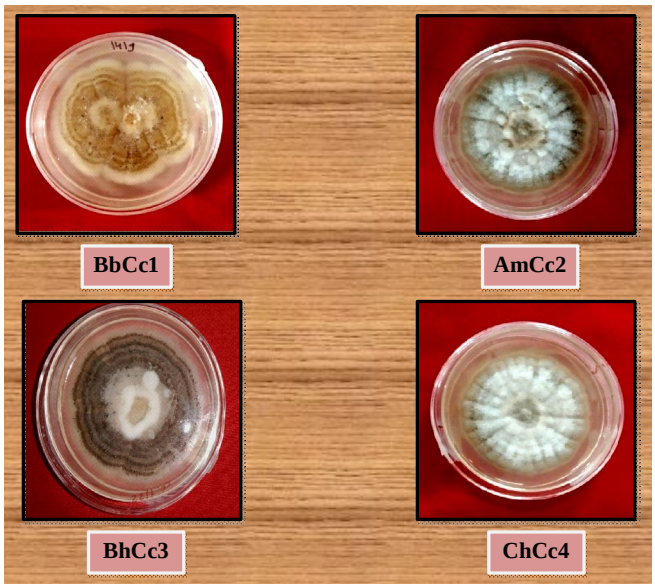

Fig. 2 : Cultural characteristics of *C. capsici* causing fruit rot of chilli.

corroborates with Vithal *et al*. (2020), who studied the morphological characters of ten different isolates of *C. capsici* causing chilli fruit rot with respect to radial mycelial growth, conidial characters, setae and acervuli on PDA to study variability among the isolates. Cc1, Cc6 and Cc7 isolate exhibited similar colony colour, conidia and acervuli characters, Cc2 and Cc4 forming ash colonies with concentric rings, while Cc3, Cc8 and Cc9 showed white to ash colonies and Cc5 and Cc10 form light black colonies. Among the ten isolates of *C. capsici*, maximum radial mycelial growth 82.42 and 81.94 mm was recorded in Cc5 and Cc7 respectively, where as minimum growth (74.28 mm) was recorded in Cc3.

The outcomes of this experiment are also accordance with the results of Sonakar *et al*. (2020), who studied cultural and morphological characteristics of *C. capsici* causing anthracnose of chilli. Colony colour varied from whitish to dark grey and brownish colony. Colonies had

Table 3 : Cultural variability of *Colletotrichum* causing fruit rot in chilli.

S. no.	Location	Isolates	Colony color	Sporulation	Type of margin	Radial mycelial growth (mm)	Type of colony growth
1	Borbhatha	BbCc1	Brownish white	++++	Regular margin	80.00	Colonies brownish white, concentric rings with uniform growth, white patches in the centre, and white margins all along the border.
2	Amleshwar	AmCc2	Black and White	++++	Irregular margin	85.00	Colonies black and white in colour with profuse growth of mycelium.
3	Bhadbhut	BhCc3	Black and White	++++	Regular margin	85.00	Black and white coloured colonies with white patches in the centre forming a concentric ring with uniform growth.
4	Chapra	ChCc4	White	++++	Irregular margin	80.00	Colonies the upper surface of white in colour while reverse surface on the PDA plate appeared black colour with profuse growth of mycelium

surface on the PDA plate appeared black in colour.

Similar result to present investigation was cottony or fluffy mycelial growth with regular and irregular margin. The length and breadth of conidia varied

significantly between 18.1- 27.1 µm and 1.6 – 2.3 µm, respectively. The same result was also recorded by Kumar *et al*. (2019) studied isolates of *C. gloesporioides* and the maximum mycelial growth (90.00 mm) was recorded by the isolates I5, I8, I18 and I20 followed by I3 and I14 recorded (88.00 mm) seven days after inoculation. Sayiprathap *et al*. (2018) recorded the sporulation was also varied among the isolates, excellent sporulation (++++) was found in Cg-5 and Cg-7 isolates, whereas, poor (+) was found in Cg-10 isolate.

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References

Dasgupta, M.K. (1981). *Principles of Plant Pathology*. Allied Publishers Pvt. Ltd., India. 470-500.

Hunziker, A.T. (2001). Genera *Solanacearum*: the genera of *Solanaceae* illustrated, arranged according to a new system. Gantner, Ruggell.

Isaac, S. (1992). Fungal Plant Interaction. *Chapman and Hall Press*, London. P.115.

Kumar, U.R., Usharani S. and Kumar M.A. (2019). Pathogenicity variation, morphological and cultural characteristics of *Colletotrichum gloeosporioides* isolates. *Plant Archives*, **19(1)**, 425-430.

Ramchandran, N., Madhavi R.K. and Rathnamma K. (2007). Current status of chilli anthracnose in India. The first International Symposium on chilli Anthracnose. 25, Convention Centre, Seoul National University, Korea, pp. 26.

Sayiprathap, B.R., Ekabote S.D., Adivappar N., Narayanaswamy H. and Ravindra H. (2018). Cultural and morphological variability in *Colletotrichum gloeosporides* inciting mango anthracnose. *Int. J. Chem. Stud.*, **6(4)**, 2227-2230.

Sonakar, V.K., Chandra R., Kumar S., Dhakad P.K., Behera L. and Yadav M.K. (2020). Cultural, morphological and pathogenic variability in isolates of *Colletotrichum capsici* causing anthracnose of chilli in eastern U.P. *Plant Archives*, **20**, 525-431.

Tong, N. and Bosland P.W. (1999). *Capsicum tovarii*, a new member of the *Capsicum baccatum* complex. *Euphytica*, **109**, 71-77.

Vithal, R., Koche M.D., Tekade A. and Raut B.T. (2020). Morphological and cultural studies among the isolates of *Colletotrichum capsici* causing chilli fruit rot. *J. Pharmacog. Phytochem.*, **9(3)**, 1514-1518.