

Variability in *Colletotrichum curcumae*, the incitant of leaf spot of turmeric (*Curcuma longa* L.) in Vidarbha, Maharashtra, India

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ABSTRACT

Colletotrichum curcumae, the incitant of leaf spot of turmeric (*Curcuma longa* L.) was found to exist in the form of three different strains in Vidarbha region of Maharashtra, India which could be distinguished by their symptom expression on Waigaon variety of turmeric. These strains differ in their cultural, morphological and physiological characters. Strains 1 and 3 were more virulent than Strain 2. Strain 1 produced symptoms on turmeric flowers also.

Key words: *Colletotrichum curcumae*, *Curcuma longa*, morphological variability, turmeric.

Leaf spot of turmeric (*Curcuma longa* L.) incited by *Colletotrichum curcumae* (Syd.) Butler and Bisby is a devastating disease which occurs every year in Vidarbha region of Maharashtra State, India. Examination of diseased leaves of turmeric (var. Waigaon - susceptible to leaf spot disease) collected from different turmeric growing pockets of Vidarbha region during 1982-83 showed that *C. curcumae* exhibited three specific types of leaf spot symptoms. It was therefore felt worthwhile to investigate the variation in pathogenicity and cultural characteristics in three isolates (from each spot type) of *C. curcumae*. Isolations were made from diseased leaves by tissue segment method

(Rangawami 1979). Three isolates of *C. curcumae*, thus obtained, were purified by mono spore culture method and maintained on PDA at $25 \pm 1^\circ\text{C}$. Pathogenicity tests were conducted by spraying spore suspension (100 conidia per microscopic field with magnification $\times 100$) of *C. curcumae* on surface sterilized leaves along with petioles of 1 month old plants. Each isolate was inoculated separately and leaves were kept moist for 48 hours. Four replicates (pots) were maintained for each isolate in earthen pots of 22 cm diameter. Uninoculated plants served as control. Flowers of turmeric were also inoculated separately in a similar manner. Plants were watered regularly and

Table 1. Symptom expression of isolates of *Colletotrichum curcuma* on turmeric (var. Waigaon)

Isolate	Days required for symptom expression	Leaf area infected (%)	Type of leaf spot	Days required for acervuli formation	Petiole infection	Flower Infection
Isolate 1	7	75	Red spherical spots with acervuli in concentric rings	2	+	++
Isolate 2	8	15	Black oval spots with white centre; scattered acervuli on white area	3	-	-
Isolate 3	7	75	Brown oval papery spots with amphigenous acervuli	2	+	+

+ Infection on petiole exhibiting eye shaped spot with black margin and with straw coloured centre showing acervuli

++ Infection on floral bracts producing circular reddish brown spots with few acervuli

- No infection

Table 2. Cultural and morphological characteristics of *Colletotrichum curcumae* isolates*

Isolate	Colony	Growth rate	Mycelium	Sclerotia	Acervuli	Conidia	Setae
Isolate 1	90	10.00	Light brown, profuse aerial mycelial growth	Present	Circular, thickly populated, 66-247µm	Slightly curved, one end rounded, other bluntly pointed, less granulated, 3 globules in conidium, 13.20-23.10 × 2.64-4.94 µm	3 septate, dark brown at base, light brown at upper part, erect to curved, blunt apex, 79.2-264.0 × 2.48-3.30 µm
Isolate 2	80	8.88	Light brown, less aerial mycelial growth	Absent	Circular, sparse, 39.6-181.5µm	Falcate, both ends bluntly pointed, more granulated, 1 globule in centre, 11.50-19.80 × 2.48-4.13 µm	2 septate, dark brown, erect, pointed apex, 56.1-168.3 × 2.48-4.95 µm.
Isolate 3	72	8.00	Light brown, less aerial mycelial growth	Absent	Hemispherical, sparse, 132-231µm	Slightly curved, blunt ends, less granulated, 2 globules, 16.5-23.1 × 2.64 µm	1 septate, light brown throughout the length, wavy, erect to slightly curved, pointed apex, 85.80-168.30 × 2.64-4.13 µm.

* After 9 days in Czapek Dox agar

examined for symptoms on leaves, petioles and flowers. Reisolation of respective pathogens confirmed the Koch's postulates.

Sterilized petri plates (90 mm dia) containing 25 ml of Czapek's Dox Agar medium were seeded with 5 mm fungal culture discs cut from the periphery of 7 days old culture of each isolate and incubated at $25 \pm 1^\circ\text{C}$ for 9 days. Three replicates were maintained for each isolate. Colony diameters were recorded after 9 days. The size of 100 acervuli, 100 conidia and 100 setae per isolate were measured.

Isolates 1, 2 and 3 of *C. curcumae* exhibited symptoms on leaves after 7, 8 and 7 days of inoculation, respectively. Among the three isolates (IMI 290447, 290446, 290449) isolates 1 and 3 were more aggressive infecting 75 per cent leaf area, while isolate 2 was less aggressive (Table 1).

The three isolates were capable of exhibiting characteristic field symptoms. Isolate 1 produced symptoms on floral parts also while isolate 2 and 3 did not produce any symptom on floral parts. This therefore helped to distinguish isolate 1 from isolates 2 and 3. Isolates 1 and 3 gave rise to eye shaped spots with acervuli on petiole. Isolate 2 did not produce any symptom on the petiole.

The results presented in Table 2 indicate that isolates 1, 2 and 3 differed from each other in cultural and morphological characteristics i.e. growth rate, formation of sclerotia, diameter of acervuli, conidial shape and size, colour and septation of setae. Isolate 1 showed maximum linear growth (90mm) followed by isolates 2 and 3. Only isolate 1 produced setose sclerotia at the periphery of colony. Isolate 3 produced hemispherical acervuli while isolates 1 and 2 formed spherical acervuli. Conidial size of isolate 1 was more in comparison to isolate 2. Globules were observed in the conidia of isolates 1, 2 and 3 in the order of 3, 1 and 2 respectively. Number of septa of setae of acervuli also varied from isolate to isolate.

It can be concluded from the above results that there existed three strains of *C. curcumae* in Vidarbha region which could be distinguished by their symptom expression on Waigaon variety of turmeric. Existence of three strains of *C. curcumae* has not been reported earlier.

Reference

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