

Some Parasitic Fungi on Turmeric From India¹⁾

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With Plate X

Turmeric (*Curcuma longa* L.) crop suffers from relatively few fungous diseases besides the leaf spot incited by *Taphrina maculans* Butler. These diseases are often found to cause much damage to the crop in southern India (2, 5, 6, 7). The crop is widely cultivated in the northern states as well; it forms a major cash crop in some places such as Deoria and Gorakhpur districts. During the course of periodical crop surveys of the cultivated fields in this region, several fungi on this crop host were collected and identified; some of them caused appreciable damage to the crop. An account of the identifications is presented here. Portions of the type materials are being deposited in the Herbarium Crypt. Indiae Orient., Indian Agricultural Research Institute, New Delhi and Commonwealth Mycological Institute, Kew, England.

1. *Phaeorobillarda curcumae* n. spec.

Maculae dispersae, ovales vel irregulares, $5-15 \times 4-9$ mm., cinereae, linea tenui, brunnea marginatae; pycnidia amphigena, obscure brunnea, dispersa, subepidermalia, innata, postea erumpentia, ostiolata, globosa vel plus minusve deplanata $78.5 \times 142.5 \mu$; pariete pseudoparenchymatico, e cellularum stratis 2-3 composito; conidiophora simplicia, hyalina acuminata tenuiter tunicata; conidia olivacea, ellipsoidea, uniseptata ad septum leniter constricta, $10.5-13.1 \times 2.1-3.2 \mu$, antice ciliis $16.8-22 \times 0.5 \mu$, hyalinis continuis, acuminatis, plerumque rectis praedita.

Infection foliicolous; leaf spots scattered, oval to irregular, 5 to 15×4 to 9 mm, ashen grey and surrounded by a thin brown band. Fruiting amphigenous. Pycnidia dark brown, scattered, subepidermal, erumpent and mostly immersed in host tissues, ostiolate, globose to flattened, pycnidial wall made of 2 to 3 layers of pseudoparenchymatous cells; pycnidia measuring $78.5 \times 142.5 \mu$ in diam. Conidiophores hyaline,

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simple, tapering and thinwalled. Conidia olive brown, mostly elliptical, bicelled, slightly constricted at the septum, 3 rarely 2 ciliate terminally, measuring 10.5 to 13.1×2.1 to 3.2μ . Ciliate processes hyaline, non-septate, tapering, mostly straight and measuring 16.8 to $22 \times 0.5 \mu$.

On living leaves of *Curcuma longa* L. at Varanasi, U. P. on 12 November, 1963. Leg. R a j e n d r a U p a d h y a y. TYPE (MSP. no. 340). (Figs. no. 1 to 3).

The infection appears on the turmeric leaves in October—November as small gradually extending necrotic spots. Full grown spots measure over 15×9 mm, when black dot-like pycnidia appear on them. The disease incidence has been relatively mild infecting only a few leaves in some of the fields. Cross sections of these leaves through the amphigenous pycnidia show them immersed in the leaf tissues. The olive brown, mostly elliptical, 2-celled conidia bearing the hyaline, stiff, ciliate processes at the terminal end are characteristic. Single spore isolates grown on potato dextrose agar medium (pH 6.5) gave ashen grey mycelial growth, studded with minute blackish brown pycnidia after a week. These were much larger in size (200 to 450μ) than those on the leaves ($78.5 \times 142.5 \mu$). The spore mass extruded out at maturity as a glistening mass above the ostiole.

Batista and Bezerra (1) described a monotypic genus *Phaeorobillarda* Batista and Bezerra to accommodate a *Robillarda*-like fungus having yellowish brown conidia. Our collection closely resembles this fungus species — *P. trichaeta* Batista and Bezerra — in the generic characters, but is distinct in morphology of the fruiting structures and host parasitism. It is, therefore, proposed to accommodate under a new species. No species other than the type has been described in this genus so far and this is the first record of occurrence of this fungous genus from India.

2. *Colletotrichum capsici* (Sydow) Butler and Bisby in Fungi of India, Imp. Coun. Agric. Res. India, Sci. Monogr. 1: 152, 1931.

On living leaves of *Curcuma longa* L. at Bhatpar Rani, Deoria, U. P. on 15 October, 1964. Leg. R a j e n d r a U p a d h y a y.

The infection appears as elliptical to oblong diffuse chlorotic spots on the turmeric leaves. Initially they are small in size but soon enlarge to 5×2 cm. Sometimes 2 or more spots coalesce into blotches. They turn straw grey in the center with a brown peripheral band. Numerous black dot-like acervuli develop epiphyllously sometimes amphigenously in concentric rings on these spots. The disease occurs in this region during September—November in a mild form, but is severe in fields, when the crop is grown mixed with pigeon pea (*Cajanus cajan* (L.) Millsp.) which provides shady, moist environment; it spreads to most of the plants in the field.

The pathogen resembles *Colletotrichum capsici* with slight variations in its morphology, to which species it is referred. It has been reported to incite a severe anthracnose disease on the turmeric crop in South India (5), but not from the northern states so far.

3. *Phyllosticta zingiberi* Ramakrishnan in Proc. Indian Acad. Sci. B 15: 170, 1942.

On living leaves of *Curcuma longa* L. at Varanasi, U. P. on 7 October, 1963. Leg. Rajendra Upadhyay.

The disease occurs during August—October affecting 15 to 20% plants in the field. Infection appears as minute necrotic spots on the leaves, which become greyish papery white in the center surrounded by a thin reddish brown band; they measure $7-12 \times 5-8$ mm sometimes coalescing into bigger patches. The spots are surrounded by a diffuse chlorotic area in the lamina. Minute blackish brown, half-immersed, ostiolate pycnidia develop on the papery center measuring $52-180 \mu$ in diam. Their walls are relatively thin and composed of 1—2 layers of dark brown pseudoparenchymatous cells. The conidia are unicellular, oval, hyaline, 3.8 to 6.1×2.3 to 3.1μ and extrude out in cirrhiae on coming in contact with water.

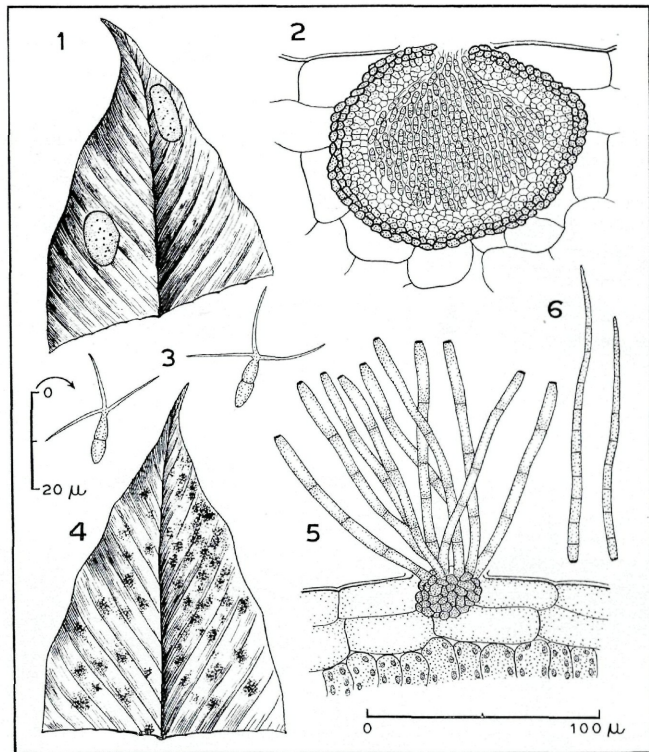
The fungus closely resembles *Phyllosticta zingiberi* reported parasitic on *Zingiber officinale* Rosc. (4) and *Curcuma longa* L. (7), to which it is referred. Its parasitism on *Curcuma longa* has been reported from South India (7) and this report forms a new record for the host crop from North India.

***Cercospora curcumaelongae* sp. nov.**

Maculae primum obscure brunneae, postea nigrescentes, 2—5 mm diam.; caespituli amphigeni, in hypostromatibus sub stomatiis bene evolutis, ovoideis vel irregularibus, e cellulis obscure brunneis compositis orti; conidiophora olivacea, in apice pallidiora, fasciculata, non geniculata, simplicia, 2—5-septata, $82.5-130 \times 5-5.5 \mu$; conidia subhyalina acicularia vel subcylindracea, postice truncata, antice acuta, 3—19-septata, $50-192 \times 2.5-3.8 \mu$.

Infection foliicolous; leaf spots dark brown, becoming sooty black later, irregular 2 to 5 mm in diam. Fruiting amphigenous. Stroma substomatal, well developed, oval, made of polyhedral, dark brown cells. Conidiophores olive brown, pale at the tips, fasciculate, nongeniculate, simple, 2—5 septate, measuring 82.5 to 130×5 to 5.5μ . Conidia subhyaline, acicular to subcylindric, truncate at the base and acute at the tip, 3 to 19 septate, measuring 50 to 192×2.5 to 3.8μ .

On living leaves of *Curcuma longa* L. at Varanasi, U. P. on 3 January, 1964. Leg. Rajendra Upadhyay. TYPE (MSP no. 341). (Figs. no. 4 to 6).



The infection starts during September—October and the disease may be seen in the field until January, when the crop is harvested. The disease symptoms are not clearly evident in early stages of their development. Infection initiates as small, diffuse, chlorotic spots on the green leaves, gradually increase in size and turn brown later. Fructifications appear in profusion, when the leaves dry up, imparting them a sooty appearance. No significant loss in yield was apparent, although 10—15% plants were infected.

The species differs from *Cercospora curcumae* Govindu and Thirumalachar on *Curcuma longa* L. (2) in having longer, unbranched and nongeniculate conidiophores and longer, subhyaline, acicular conidia with more septation. It is similarly distinct from other *Cercospora* species parasitic on members of Zingiberaceae. The fungus is, therefore, accommodated as a new species.

5. *Myrothecium roridum* Tode ex Fr. in Systema Mycologicum 3: 217, 182.

On living leaves of *Curcuma longa* L. at Varanasi, U. P. on 7 September, 1964. Leg. R a j e n d r a U p a d h y a y.

The disease is prevalent on the crop during August—September causing destruction of a large portion of the infected leaves. The infection starts from the leaf tip or margin progressing inward and downward to the leaf base involving a large laminar area. The affected portions become necrotic and soon dry up. Minute, greenish black sporodochia of the pathogen erupt on the necrotic portions shredding the dry leaf parts easily. The sporodochia are superficial, discoid, minute to 0.5 mm in diam., greenish black with compact conidiophores emerging from the basal stroma and interspersed with pale greenish setose processes measuring 160—250 μ in length. The conidia are subcylindric with obtuse ends, light olivaceous green and 5.7 to 7.4 μ \times 1.6 to 3.1 μ .

The fungus resembles *Myrothecium roridum* as delineated by Preston (3) with the difference of the presence of setae. Their occurrence or absence, however, is not a distinctive character of the species and it is identified as *M. roridum*. This forms a new host record for the pathogen.

A c k n o w l e d g e m e n t

We are grateful to Dr. Franz Petrak for kindly translating into Latin diagnoses of the new species.

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Explanation of the plate.

Figs. 1—3. Infection on turmeric leaf, v. s. through pycnidium and typical conidia of *Pheorobillarda curcumae*. — Figs. 4—6. Infection on leaf, hypostroma and conidia of *Cercospora curcumae-longae*.

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