New *Cercospora* spp. associated with vegetable crops in North Eastern Uttar Pradesh

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**ABSTRACT:** Present paper describes and illustrates three new species of *Cercospora* Fres., viz., *C. capsicigena*, *C. lycopersicicola* and *C. solanigena*, collected on *Capsicum annuum*, *Lycopersicon esculentum* and *Solanum melongena*, respectively. They are compared with other morphological similar taxa.

Key words: Taxonomy, fungi, Hyphomycete, *Cercospora*.

During a periodic survey of vegetable fields in Gorakhpur and Kushinagar districts of North-Eastern Uttar Pradesh, some crops particularly Brinjal, Chilli and Tomato were found affected with fungi. During examination these were found to be of various groups of fungi including hyphomycetes. Three new species of *Cercospora* which has been identified, described and illustrated here are *Cercospora capsicigena*, *C. lycopersicicola* and *C. solanigena*, collected on *Capsicum annuum*, *Lycopersicon esculentum* and *Solanum melongena*, respectively. The novelties of these fungi have been proved by comparison with the allied taxa.

**MATERIALS AND METHODS**

Leaf sample showing clear symptoms were collected in separate polythene bags from various sites in Gorakhpur and Kushinagar districts. Microscopic slides were prepared in lactophenol and cotton blue mixture from the scrapings taken from the infected leaf portions.

The mounted slides were examined and Camera Lucida drawings made by using different powers of eye pieces and objective combinations. The taxonomic determinations were made with the help of relevant literature. Holotype specimens were deposited in HCIO, New Delhi, India.

**RESULTS AND DISCUSSION**

*Cercospora capsicigena* Bhartiya, Dubey and Singh Sp. nov. (Fig. 1).

*Maculae* amphigenae, circulares vel irregulares, denied coalescentes, extensae per totum foliae, griseo albae ad centro, brunneae ad margine, usque ad 12 mm

Fig. 1. *Cercospora capsicigena* sp. nov.

a. Stroma, b. Conidiophore, c. Conidium, d. Leaf spots

Bars: a-c = 20 μm; d = 20 mm

In foliis vivis *Capsicum annuum* (Solanaceae), Kushinagar, U.P. India, Jan., 1997, H.D. Bhartiya, HCIO 42379 holotypus, GPU Herb No. 8010 isotypus.

**Infection spots** amphigenous, circular to irregular, later coalescing to form large patches, spreading on entire leaf surface, necrotic, greyish white in centre and brown in margin, upto 12 mm wide. *Colonies* amphiphyllous, effuse, greyish. *Mycelium* internal, hyphae branched, septate, light olivaceous. *Stromata* well developed, subepidermal, pseudoparenchymous, olivaceous brown, 25-30 μm diam. *Conidiophores* arising in fascicles of 3-8, semimacronematous to macronematous, erect, straight to flexuous, unbranched, smooth-walled, 1-5 transversely septate, geniculate, light olivaceous to olivaceous brown, 14-84 × 4-6 μm. *Conidiogenous cells* integrated, terminal to intercalary, sympodial, polyblastic, cicatrized, scars conspicuous, thickened, paler in colour. *Conidia* acicular, acropleurogenous, holoblastic, dry, solitary, unbranched, 2-11 transversely septate, smooth-walled, hyaline, straight to sub straight, base truncate, apex sub acute to acute, hilum thickened, 28-100 × 3-5 μm.


A perusal of literature shows that, three species of *Cercospora* have earlier been reported on *Capsicum annuum* viz., *Cercospora capsicicola* Vassilj, *Cercospora capsici* Castellani and *C. unamunoi* Unamuno but the latter two species were considered as synonyms of *C. capsicicola* (Chupp, 1954) which itself was recombined as *Phaeoramularia capsicicola* (Vassi.) Deighton (1976). As such at present there is no record of *Cercospora* species on the host species with which we could compare the fungus in question. Moreover, the literature shows that species concept in *Cercospora* is host specific. Therefore, the fungus in question has been described and illustrated here as a new species of *Cercospora*.

*Phaeoramularia capsicicola* Bhartiya, Dubey and Singh (Fig-2)

Maculae amphigunae, circulares vel irregulares, foliae, albo ad centro, ad margine brunneae, usque ad 3 mm latae. *Coloniae* hypophyllae, effusae, griseo brunneae. *Mycelium* internum, hyphae ramosae, septatae, pallide olivaceae, *Stromata* bene evoluta, subepidermalia, pseudoparenchymatosa, atro olivacea, 32-35 μm diam. *Conidiophora* in fasciculo (Ca. 8) stromatibus oriunda, macronematosa, erecta, recta vel

<table>
<thead>
<tr>
<th>Fungus</th>
<th>Leaf spots</th>
<th>Stromata</th>
<th>Conidiophores</th>
<th>Conidia</th>
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<tbody>
<tr>
<td><em>C. lycopersici</em> Salam &amp; Rao (Chupp 1954)</td>
<td>Minute discrete</td>
<td>28.8-72 μm diam.</td>
<td>Short, asceptate, geniculate, 21.6-36 × 4.8-6.4 μm</td>
<td>Light brown, slightly constricted at septa, obclavately fusoid, 24-67.2 × 3.2-4.8 μm</td>
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<td><em>C. lycopersicicola</em> Sp. nov.</td>
<td>Coalescing to form large patches</td>
<td>32-35 μm diam.</td>
<td>Long, 1-4 septate, not geniculate, 15-86 × 4-6 μm</td>
<td>Hyaline, not constricted at septa, acicular, 20-134 × 2-4 μm</td>
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**Table 1. Comparative analyses of *C. lycopersici* and *C. lycopersicicola***

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<tr>
<td><em>C. melongenae</em> Welles (Chupp 1954)</td>
<td>4-10 mm wide</td>
<td>Only a few celled</td>
<td>Uniformly coloured, straight, geniculation from base to tip, 20-150 × 4-6.5 μm</td>
<td>Indistinctly multi-septate, apex acute, 40-120 × 2.5-5 μm</td>
</tr>
<tr>
<td><em>C. solanigena</em> Sp. nov.</td>
<td>0.5-2 mm wide</td>
<td>Well developed</td>
<td>Paler towards apex, straight to flexuous, mostly geniculate in apical portion, 16-100 × 3-5 μm</td>
<td>Distinctly 1-5 septate, apex sub acute to sub obtuse, 15-84 × 2.5 μm</td>
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**Table 2. Comparative analyses of *C. melongenae* and *C. solanigena***
interdum flexuosa, non ramosa, laevia, 1-4 transverse septata, pallide olivacea, 15-86 × 4-6 μm. *Cellulae conidiogenae* integratae, terminalae, synpodiales, polyblasticae, cicatricatae, cicatrices conidiales conspicue et incrassatae. *Conidia* acropleurogenosa, holoblastica, sicca, solitaria, non ramosa, 1-7 transversely septata, laevia, hyalina, acicularia, recta vel curvata, basim truncata, apicem sub acuta vel sub obtusa, hilo conspicuo et incrassato, 20-134 × 2-4 μm.  


Two species of *Cercospora* were reported earlier on the host species, viz., *C. fuligena* Roldorn (Chupp, 1954) and *C. lycopersici* Salam and Rao (1957). Out of these the first one has been recombined as *Pseudocercospora fuligena* (Roldorn) Deighton 1976). Therefore, our fungus is comparable with only *Cercospora lycopersici* and this comparison shows that both the fungi are distinctly different (Table I). Leaf spots of *Cercospora lycopersici* are minute and discrete whereas those of our fungus are coalescing to form large patches and also the former has larger stromata than the latter. Conidiophores of *C. lycopersici* are aseptate, geniculate and shorter whereas those of our fungus are 1-4 septate, non geniculate and longer. Moreover, conidia of *C. lycopersici* are light brown, slightly constricted at septa, obclavately fusoid and shorter whereas those of the fungus in question are hyaline, not constricted, acicular and longer. Further, the colour and shape of conidia of *C. lycopersici* warrant that it is not a *Cercospora* and it should be better placed in some other suitable genus. Therefore, the fungus in question has been described and illustrated here as new species.

*Cercospora solenigena* Bhartiya, Dubey and Singh (Fig. 3)

*Maculae* amphigenae, circulares vel irregulares, deinde coalescentes, atro bruneae ad centro, pallide bruneae ad margine, 0.5-2 mm latae. *Coloniae* amphiphylae, effusae, pallide bruneae. *Mycelium* internum, ex hyphis ramosis, septatis, pallide olivaceae. *Stromata* bene evolute, pseudoparenchymatosa, atro olivacea, 10-30 μm diam. *Conidiophora* in fasciculo (1-4) stromatibus oriunda, macronematosa, mononematosa vel fasciculata, erecta, recta, vel flexuosa, nonrmosa, laevia, 1-6 transverse septata, geniculata, pallide bruneae vel atro bruneae, 16-100 × 3-5 μm. *Cellulae conidiogenae* integratae, terminales, polyblasticae, cicatrixe conidiales conspicue et incrassatae, palliodora versus apicem. *Conidia* acropleurogenosa, holoblastica, sicca, solitaria.

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**Fig. 2. Cercospora lycopersicicola** sp. nov.  
a. Stroma. b. Conidiophore. c. Conidium. d. Leaf spots  
Bars: a-c = 20 μm; d = 20 mm
nonramosa, 1-5 transverse septata, laevina, acicularia, recta vel curvata, basim truncata, apicem sub-acuta vel sub obtusa, hilo incrassato, 15-84 × 2-5 μm.


Leaf spots amphigenous circular to irregular later coalescing, necrotic, dark brown in centre and light brown in margine, 0.5-2 mm wide. Colonies amphiphyllose, effuse, light brown. Mycelium internal, hyphae branches, septate, dark olivaceous. Stromata well developed, pseudoparenchymatous, dark olivaceous, 10-30 μm in diam. Conidiophores arising in fascicles (1-4) from stromata, macronematous to fasciculate, erect, straight to flexuous, unbranched, smooth, 1-6 transversely septate, geniculate, light olivaceous to dark brown, 16-100 × 3-5 μm. Conidiogenous cells integrated, terminal, polyblastic, cicatrized, scars conspicuously, thickened, paler in colour, Conidia acropleurogenous, holoblastic, dry, solitary, unbranched, 1-5 transversely septate, smooth walled, hyaline, acicular, straight to curved, base truncate, apex sub acute to sub obtuse, hilo thickened, 15-84 × 2-5 μm.


The literature shows that only one species viz., Cercospora melongenae Welles (Chupp, 1954, Pollack, 1987) was reported earlier on the same host species, Solanum melongena. Comparison of our fungus with C. melongenae shows that the former is distinctly different (Table 2). Leaf spots of C. melongenae are larger than those of our fungus and stromata of the former are only few celled whereas the latter has well developed stromata. The conidiophores of C. melongenae are uniformly coloured, straight, geniculate from base to tip and larger whereas those of the latter are paler towards the apex, straight to flexuous, mostly geniculate in the apical part and shorter. Moreover, the conidia of the former are indistinctly multisepate with acute apex and longer whereas those of the latter are distinctly 1-5 septate with sub acute to sub obtuse apex and shorter. The fungus in question is therefore, described and illustrated here as new species.

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REFERENCES


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