



NEW RECORDS OF THREE CERCOSPORA SPECIES FROM WEST BENGAL, INDIA

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ABSTRACT: Three dematiaceous leaf inhabiting fungi viz. *Cercospora adenostemmae* Togashi et. Katsuki, *Cercospora gerberae* Chupp & Viegas, and *Cercospora helianthicola* Chupp & Viegas, have been collected and described and compared with related species. These are genus first time reported from West Bengal.

Key words: New report, foliicolous hyphomycetes, morphotaxonomy, West Bengal.

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INTRODUCTION

The genus *Cercospora* was erected by Fresenius (1863), which is one of the largest genera of hyphomycetes producing vermicular frugosporic conidia. This genus is globally distributed and represented by around 3000 species Kamal [1]. In fact, it is a heterogeneous assemblage of hyphomycetes representing a “complex” (*Cercospora* Complex), rather than a single generic entity. The genus was monographed by Chupp[2]. The taxonomic position of the genus *Cercospora* is almost accepted as being a member of the form family *Dematiaceae*, under the order *Hyphomycetes* of the form class *Deuteromycetes*.

A large number of the species of *Cercospora* are pathogenic with diversified host range and most of them are known only from their morphotaxonomical characters *in vivo*. The reproductive structure of the fungi is the *conidia*, acropleurogenous, simple obclavate or subulate, colourless or pale, pleuriseptate, smooth. *Conidiophores* macronematous, mononematous, caespitose, straight or flexuous, sometimes geniculate, unbranched or rarely branched, olivaceous brown or brown, paler towards the apex, smooth. Researchers from all over the world have made valuable contributions on the genus *Cercospora*. Some of them are :Behrooz *et al* [3], Braun and Hill [4], Ellis [5], Firmino *et al* [6], Groenewald *et al* [7], Hesami *et al* [8], Hong *et al* [9], Kim *et al* [10], Kirschner [11], Milosavljevic *et al* [12], Nakashima *et al* [13], Souza and Maffia [14] and Shivas *et al* [15].

Indian researchers have not fallen back, a good number of workers have worked on this group of fungi. Special mention may be made of some as: Archana and Dubey [16], Bhat [17], Bilgrami *et al* [18] Haldar and Ray [19], Haldar and Ray [20], Haldar and Ray [21], Hosagoudar *et al* [22], Jamaluddin *et al* [23], Kumar *et al* [24], Mall [25], Meghvansi *et al* [26], Patil *et al* [27], Raghavendra *et al* [28], Sharma *et al* [29], and Swamy *et al* [30].

During working on dematiaceous hyphomycetes from West Bengal the author had identified three species of *Cercospora* viz. *Cercospora adenostemmae*, *Cercospora gerberae* and *Cercospora helianthicola*. Review of literature reveals that the species of *Cercospora adenostemmae*, *Cercospora gerberae* and *Cercospora helianthicola* have been reported from the states of Uttar Pradesh (U.P), Maharastra, Bihar, Karnataka, Andhra Pradesh (A.P.) and Delhi., (Bilgrami *et al* 1991, Jamaluddin *et al* 2001, Kamal 2010) but it is yet to be reported so far from West Bengal. Hence it is the first time report of the occurrence of these fungi from the state of West Bengal.

MATERIALS AND METHODS

The infected leaves of different ages were detached intact from the host plants and they were kept in polythene bags, closing the mouth by rubber ring. The infected leaves having distinct symptoms were collected and dried to make herbarium specimens, a part of which was deposited in the herbarium of IMI, Kew, Surrey UK. Depending on the size of the leaf and the nature of infection the entire or a portion of the infected host tissue along with the adjoining healthy tissue was detached carefully with a sharp scalpel. It was then mounted on a glass slide in a drop or two of lacto phenol and covered with a cover glass and warmed on a flame so as to make the host tissue transparent. Stained preparations were also made with lacto phenol accompanied with a drop of cotton blue to study the details of transparent parts of the fungal specimens. Morphotaxonomic study of the associated fungi was done through the low and high magnification of the compound microscope. The measurements of the different structures were also taken and camera lucida drawings were made with the aid of standard camera lucida attachment.

RESULTS

Cercospora adenostemmae Togashi et. Katsuki. *Bot. Magazine*, Tokyo **65**:18,1952.

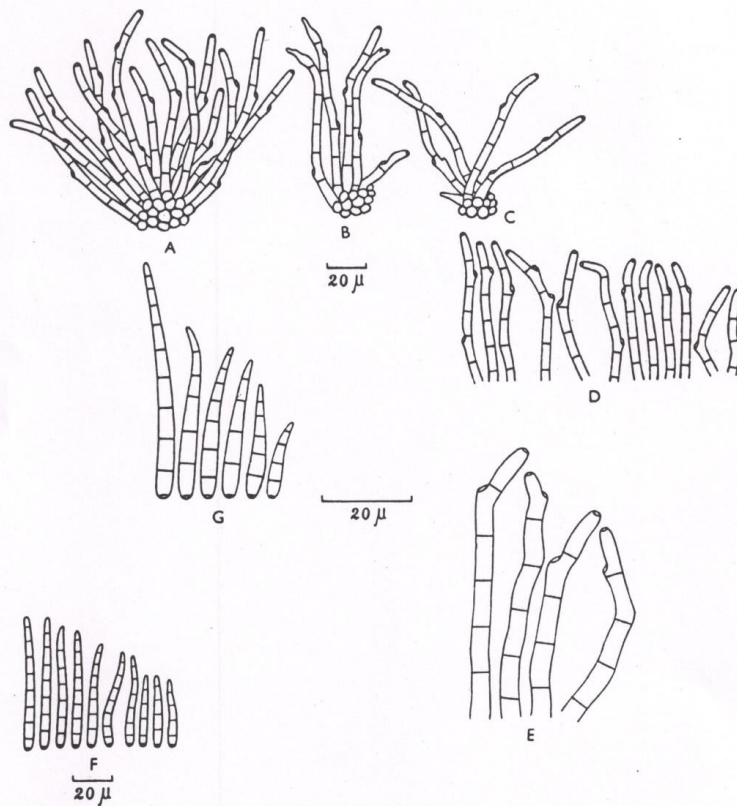


Fig.1 *Cercospora adenostemmae*.
A-C. Conidiophore fascicles,
D-E. Conidiophores,
F-G. Conidia.

Leaf spots amphigenous, distinct on dorsal surface, indistinct on ventral surface, scattered, sometimes coalescent, vigorous, pale white centre, surrounded by dark brown to blackish margin, 1-6 mm extn., *caespituli* amphigenous, chiefly hypophyllous, dark; *stroma* present and well developed; *conidiophores* fasciculate, 3-12 in a fascicle, pale olivaceous brown to light brown, slightly paler at the apex, simple, straight to slightly curved, pleuriseptate (upto 7 septa), distinct, mildly narrower towards the tip, very poor geniculation in some cases, conidial scar present and distinct, thickened, lying by the side wall or tip of the conidiophores, tip sub obtuse to acute, $35.7-86.1 \times 5.77-6.3 \mu$; *conidia* cylindrical to obclavate cylindrical, straight, olivaceous, mildly curved, smooth, thick walled, pleuriseptate, slightly tapered to thickened distinct hilum, $34.99-96.6 \times 3.15-4.2 \mu$.

Specimen studied: On the living leaves of *Adenostemma viscosum* Forst., (Fam. Asteraceae), Darjeeling, West Bengal, India, IMI 372362, 29 September, 1995.

Cercospora gerberae Chupp & Viegas, *Bol da, Soc. Brasil, de Argon.* **8** : 27,1945.

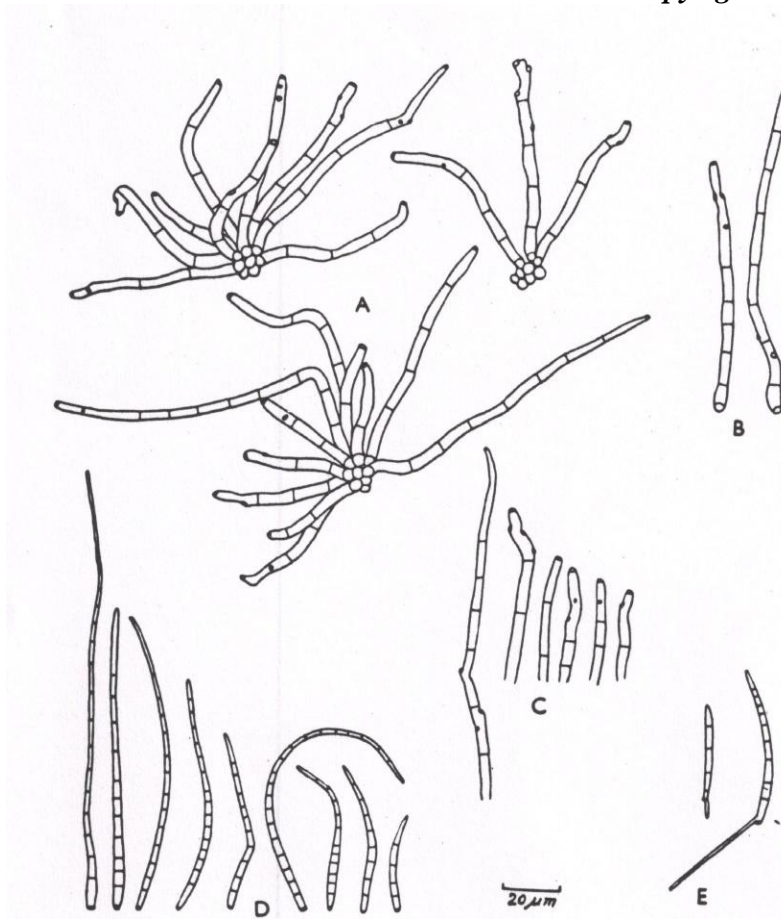


Fig.2 *Cercospora gerberae*.
 A. Conidiophore fascicles,
 B. Solitary conidiophores,
 C. Conidiophores,
 D. Conidia,
 E. Conidia showing germtubes.

Leaf spots amphigenous, well developed on dorsal surface, light brown centre with dark brown margin, to almost black at maturity, circular to sub circular, numerous, scattered, virulent, 1.5-2.5 mm diam., *caespituli* amphigenous, chiefly epiphyllous, effuse; *stroma* present, composed of a few brown cells; *conidiophores* emerging through stomata, usually fasciculate, in fascicles of 2-15 divergent stalks, emerging through stomata, sometimes solitary, olivaceous brown, paler and narrower towards the tip, smooth, thick walled, simple, straight to flexuous, 1-3 geniculate, sparingly septate (1-12), base slightly swollen, tip obtuse to sub obtuse, with distinct spore scar (1-8), spore scar 2.5 µ in diam., 20.0-214.5 × 4.0-5.0 µ; *conidia* hyaline, acicular, thin walled, straight to curved, smooth, indistinctly pleuriseptate (3-17), base truncate, tip acute to sub acute, 43.0-198.0 × 2.0-3.0 µ.

Specimen studied: On the living leaves of *Gerbera* sp. (Fam. Asteraceae), Madhyamgram, North 24 Parganas, West Bengal, India, IMI 304867, 11 May, 1985.

Cercospora helianthicola Chupp & Viegas, Bol. da, Soc. Brasil.de. Agron.8 : 29, 1945.

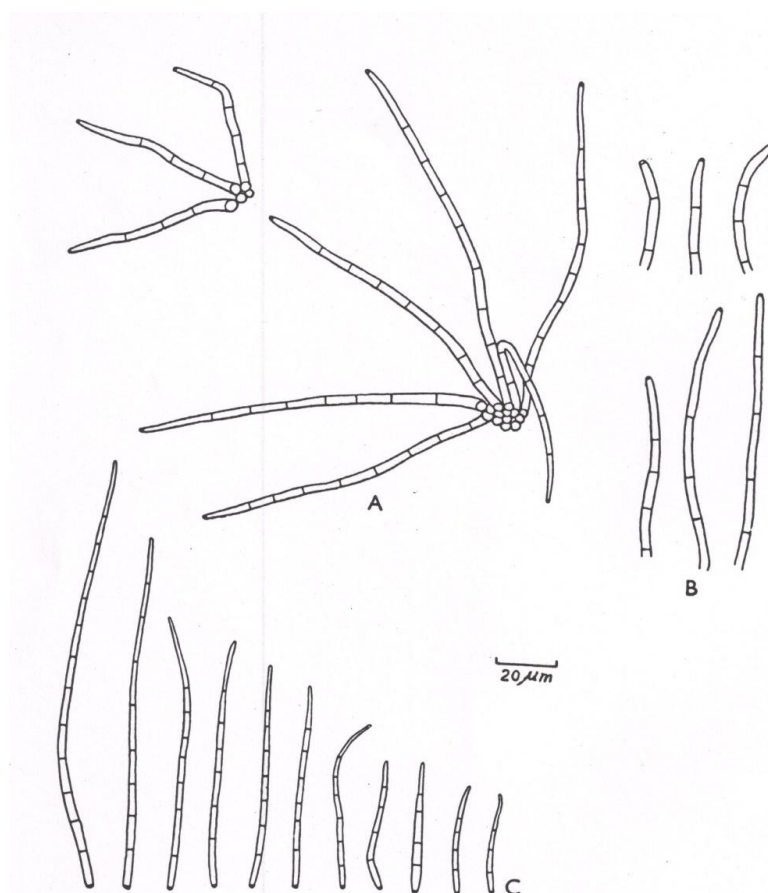


Fig.3 *Cercospora helianthicola*.
 A. Conidiophore fascicles,
 B. Conidiophores,
 C. Conidia.

Leaf spots amphigenous, distinct on dorsal surface, light reddish brown, initially very minute, older spots irregular, virulent, scattered, covering major portion of the leaf surface, numerous, up to 5mm in extn., *stroma* none, only a few loose mass of cells; *conidiophores* fasciculate (2-6), stalks divergent, emerging through the stomata, olivaceous brown, more paler and narrower towards the tip, usually simple, very rarely branched, smooth, thick walled, rarely geniculate, distinctly multiseptate (upto 7), straight to bent, base swollen, apex rounded, spore scar (2.5 μ), tip geniculate, in diam., 26.5-198.0 \times 3.0-5.0 μ ; *conidia* acicular hyaline, straight to curved, smooth, indistinctly multiseptate (2-17), base truncate, apex bluntly rounded, 49.5-237.6 \times 2.5 - 4.0 μ .

Specimen studied: On the living leaves of *Helianthus annuus* L., (Fam. Asteraceae), Bhabla, North 24 Parganas, West Bengal, IMI 311791, 16 August, 1986.

DISCUSSION

This fungi *Cercospora adenostemmae*, *Cercospora gerberae* and *Cercospora helianthicola* are abundant in nature during the month of October to March of the year forming striking symptoms such as spot may be regular or irregular, sometimes concentric rings with brown to dark brown margin, blotch sooty in nature and blight. Spots become sometimes necrotic leaving hole in the leaves.

CONCLUSION

The present study reveals that the *Cercospora adenostemmae*, *Cercospora gerberae* and *Cercospora helianthicola* primarily grows on the leaf blades as well as petioles, stems, inflorescence and fruits. The characteristics of the symptoms depend on the nature of leaves as well as parasites. The effects may vary from plant to plant and even on same plant. When infection reaches a certain degree of severity, the leaves curl, dry and drop down. Thus it may be concluded that the species of the genus *Cercospora* grow vigorously on leaves throughout the seasons but virulent in winter to early summer.

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