

## STUDY OF NEW SPECIES *ALTERNARIA SOLANACEARUM* SP. NOV. FROM SOUTH SAGAR FOREST DIVISION OF MADHYA PRADESH, INDIA

ARPANA MISHRA\* AND SHRINARAYAN TRIPATHI

Department of Botany,  
Pt. J.L.N.P.G. College, BANDA (U.P.), INDIA

\*Corresponding Author :

E-mail : arpanamishra@ymail.com

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### ABSTRACT

On the basis of isolation and morphological studies, the new species of *Alternaria* was identified as *Alternaria solanacearum*. The specimens were collected from Kotkhera, Sarra, Range, Nauradehi (W.L.S.), South Sagar Forest Division, (M.P.) India, and deposited in H.C.I.O., New Delhi. Morphotaxonomic determination being done on comparison with allied taxa in question and current literature.

Figure : 01

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Table : 01

KEY WORDS : *Alternaria*, Follicolous, Fungi.

### Introduction

The hyphomycetes are a group of the fungi imperfecti. They include besides the *mycelia sterilia*, *conidial* fungi in which the conidiophores are free and are borne on mycelium or in sporodochia, synnemata, but not within pycnidia or acervuli. The majority of hyphomycetes lack sexual reproduction.

*Alternaria* is a genus of Pleosporaceae, described by Nees ex Wallroth in 1816. *Alternaria* is spread by airborne spores. Rain events or sudden changes in relative humidity also favor spore release. Spores are produced on older lesions formed on wilted twigs and mature leaves. Some spores come from fruit lesions but they are not a major inoculum source. Even the leaf contributes to the inoculum. Although the spores are airborne and carried by winds, *Alternaria* brown spot is often spread among groves on nursery stock transported by humans.

*Alternaria alternata* is a fungus which has been recorded causing leaf spot and other diseases on over 380 host species of plant. It is an opportunistic pathogen on numerous hosts causing leaf spots, rots and blights on many plant parts.

Workers<sup>1</sup> reported that decreased tuber quality and yield losses of up to 79% have been reported in the U.S., of which 20-40% is due to seedling losses (i.e., collar rot) in the field<sup>1</sup>. Studies on identification and pathogenicity were done on *Alternaria* spp. and potato in West Azerbaijan province Iran<sup>4</sup>.

Early blight caused by *A. solani* is the most destructive disease of tomatoes in the tropical and subtropical regions. *Alternaria solani* infected stems, leaves and fruits of members of Solanaceae family such

as tomato (*Solanum lycopersicum*), potato (*S. tuberosum*), eggplant (*S. melongena*), bell pepper and hot pepper (*Capsicum* spp.).

The objective of the study includes isolation, identification and morphological study of a new species of *Alternaria* (*A. solanacearum*) on infecting leaves of *Datura metel* in Nauradehi, south Sagar forest division, M.P. India,

### Study area

Nauradehi wild Life Sanctuary (NWLS) was established in 1975, located at the trijunction of Sagar, Damoh and Narsingpur districts and is the single largest forest block of the area. Geographically it is located at 79 5' and 79 25' East longitude; 23 5' and 23 43' North Latitude.

Encompassing an area of 1197 Sq.km NWLS is a unique protected area having two major river Basins. The maximum temperature 44.10°C and minimum temperature 9.97°C was observed.

### Material and Methods

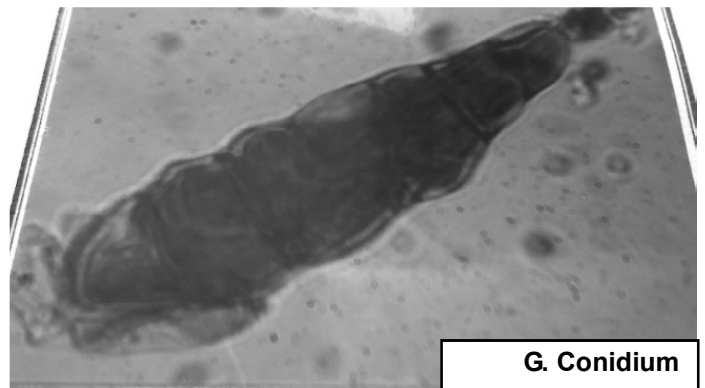
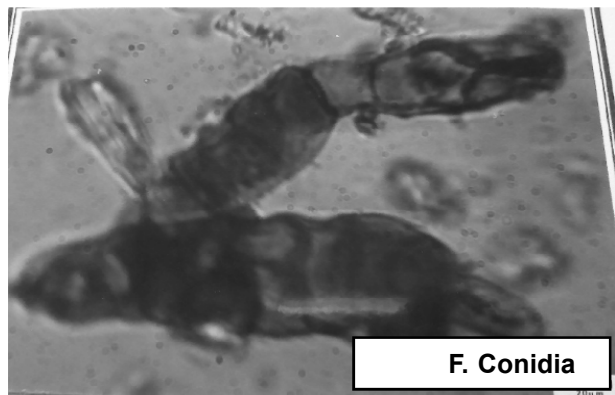
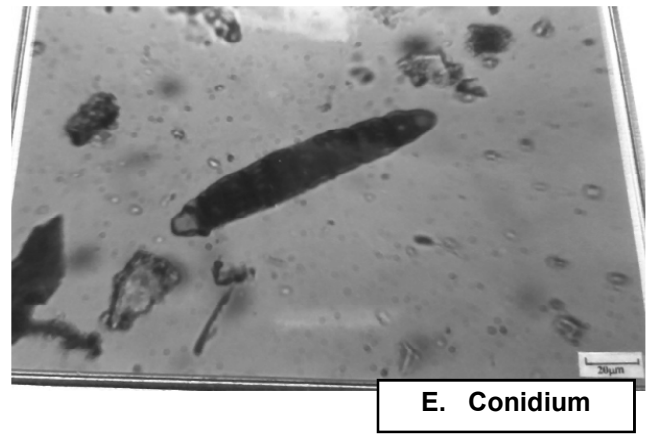
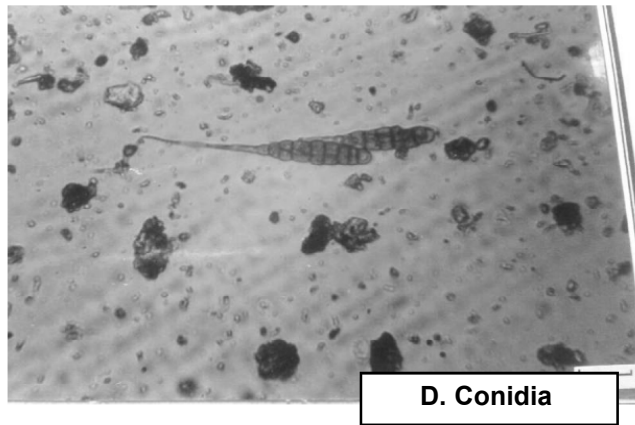
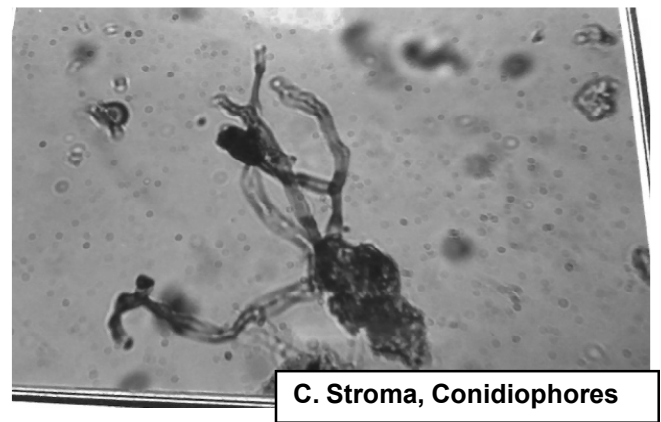
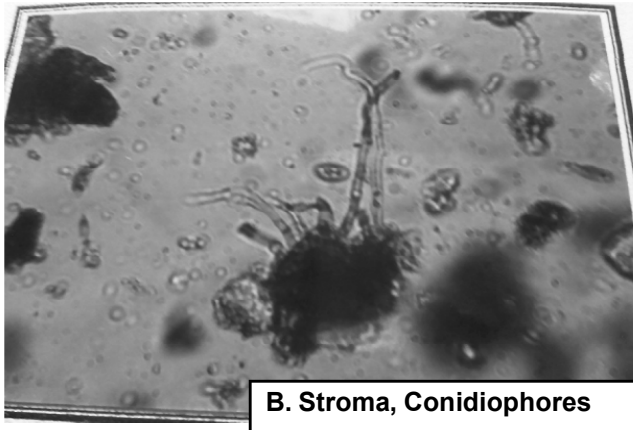
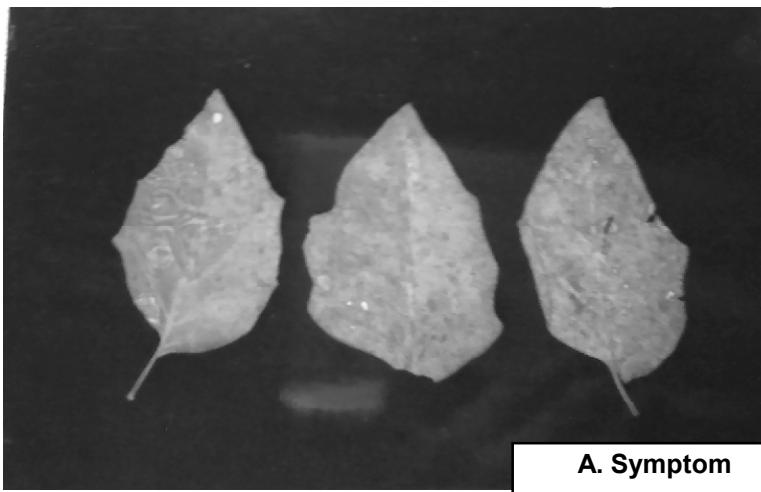
Survey of the selected sites of the forests were performed frequently and regularly to collect the imperfect fungi infecting the leaves and associated part of the plant.

The collection of living leaves of *Datura metel* Linn (*Solanaceae*) September 1999, Kotkhera, Sarra, Range, Nauradehi (W.L.S.), South Sagar Forest Division, M.P. India.

Infected leaves were collected and brought in the laboratory for further study. In the laboratory the identity of the host plants was confirmed with the help of departmental experts in Angiosperm taxonomy and

TABLE-1 : Comparative account of *Alternaria solanacearum* sp. nov. with related species

Species	Spots and colonies	Stromata colour size in $\mu\text{m}$	Conidiophores		Conidia	
			Structure	Colour and size in $\mu\text{m}$	Structure	Colour & Septation size in $\mu\text{m}$
<i>A. alternate</i> <sup>3,5</sup>	Usually black, sometime grey	Absent	Simple branched, arising singly in small group, sometimes geniculate.	Pale to mid olivaceous or golden brown up to 50 $\mu\text{m}$ long, 3-6 $\mu\text{m}$ thick.	Branched chain, obpyriform ovoid or ellipsoidal conic or cylindrical, pale pale smooth to verruculose.	Pale to mid golden brown, 20-63X9-18 $\mu\text{m}$ beak pale 2.5 $\mu\text{m}$ thick 8 trans. septa with several longi. and oblique septa.
<i>A. crassa</i> <sup>3</sup>	-	-	Conidiophores arising singly or in small groups, erect or ascending straight or flexuous, sometimes geniculate, septate.	Pale or Mid pale brown, upto 90X7-10 $\mu\text{m}$ with 1 or several scars.	Solitary, occasionally short chains, obclavate, rostrate beak generally greatly exceeding the length of the body of the spore	Pale brown, smooth 120-440X15-40 $\mu\text{m}$ thick in the broadest part. 7-10 trans. septate and usually with several longitudinal septa 4-8 $\mu\text{m}$ thick at the base, tapering to 2-2.5 $\mu\text{m}$
<i>A. solan</i> <sup>3</sup>	-	-	Conidiophores arising singly or in small groups, straight or flexuous, septate.	Rather pale brown or olivaceous brown, upto 110 X 6-10 $\mu\text{m}$	Conidia solitary, straight or slightly flexuous, obclavate, conidium oblong or ellipsoidal tapering to a beak.	Pale or mid pale golden or olivaceous brown 150-300 X 15-19 $\mu\text{m}$ with 9-11 transverse septa O-few longitudinal, or oblique septa.
<i>A. solanacearum</i> sp. nov.	Amphigenous, Circular blackish brown on the both surface, colonies epiphyllous more or less effuse and black	Poorly developed, immersed, dark olivaceous upto 28-60 $\mu\text{m}$ indiam.	Mostly arising from stroma, solitary or fasciculate in loose fascicles, straight to flexuous, smooth branched.	Light to mid olivaceous 14.5-165 X 2-5 $\mu\text{m}$	Conidia solitary, as well as catenate, obclavate, sympodial, dry ellipsoidal thick walled.	Dark olivaceous to black, smooth 9.5-96X7-15 $\mu\text{m}$ 2-9 transverse septa 1-4 longitudinal septa, beak paler than rest cells, upto 5 $\mu\text{m}$ in diameter, rostrate.



**Fig. 1 : *Alternaria solanacearum* Tripathi sp.nov. (A,B,C,D,E,F,G).**

present herbarium record or with the available literature. However, the hosts which could not be identified locally were carefully pressed in blotting papers, direct mounted in herbarium sheets, duly sprayed with 0.1% aqueous solution of  $\text{HgCl}_2$  and sent to recognized herbaria for the proper identification if necessary. Each fresh collected fungal specimen was carefully examined under the dissecting microscope. The foliicolous fungi which have been described were identified with the help of various monographs, reviews, book of respective field and research papers published in the standard journals.

After the collection of infected leaves the specimens were pressed. The slides were prepared by scrapping and free hand sections in lactophenol- cotton blue mixture. Identification were made with the help of available literature. Camera lucida drawings, description and illustration were made of interesting forms. The infected leaf specimens have been deposited in H.C.I.O. New Delhi.

## Result and Discussion

### *Alternaria solanacearum* Tripathi sp.nov.(Fig.1)

Maculae amphigenosae, circulars, parvi vel magnae, atrobrunneae in ambo superficiem cum evidens incisus fusce brunneae externe margino. Coloniae epiphyllosae, plus minsuve effuse, atro. Mycelium exhyphis, immersum, ramose, septata, glabra, obscure paulo olivacea 4  $\mu\text{m}$  crassa. Stromata bene evoluta, immersum, obscure olivacea, usque 28-60  $\mu\text{m}$  diametro. Conidiophora, pleraeque, evolutum per stromata, simplicia, erecta, macronemata, mononemata, recta vel flexuosa laevia, ramosa, pleuriseptata, solitaria vel fasciculata (in loose), pleraeque tumoribus ad basis, pallide vel medio olivacea, mesurata 14.5-165  $\mu\text{m}$  longa, et 2-5  $\mu\text{m}$  crassa. Cellulae conidiogenosae, intergratae, terminals, sympodiales, polyblasticae, cicatribus, conidial cicatribus evolutum. Conidia solitaria vel catenata, obclavata, sicca, ellipsoidea, crassa tunicata, obscure olivacea vel atro glabra, 2-9 transversis septata, interdum 1-4 longitudinibus vel oblique septata mesurata 9.5-96  $\mu\text{m}$  longa, 7-15  $\mu\text{m}$  ad broadest region, beak pallidae, usque 5  $\mu\text{m}$  in diam, rostratus.

In foliis vivis *Datura metel* Linn (Solanacearum) September (1999), Kotkhera, Sarra, Range, Nauradehi (W.L.S.), South Sagar Forest Division, M.P. India, leg. S.N. Tripathi, S.N. Herb No. SNR 261 holotype HClO 43,891.

### *Alternaria solanacearum* Tripathi sp.nov. (Fig.-1)

Lesions amphigenous, circular, small to large,

sometimes form shot holes, blackish brown on both the surface with a clear cut dark brown outer margin. Colonies epiphyllous more or less effuse and black mycelium of hyphae immersed, branched, septate, smooth, dark, pale olivaceous up to 4  $\mu\text{m}$  thick. Stromata well developed, immersed, dark olivaceous up to 28-60  $\mu\text{m}$  in diam. Conidiophores, mostly arising from stroma, simple, erect, macronematous, mononematous, straight to flexuous, smooth branched, much more transversely septate, solitary or fasciculate in loose fascicles, bases attached to stroma cells, light to mid olivaceous measuring 14.5-165  $\mu\text{m}$  long but seems even much more in length and 2-5  $\mu\text{m}$  thick. Conidiogenous cells integrated, terminal, sympodial, polytretic, cicatrized. Conidia solitary as well as catenate, obclavate, dry, ellipsoidal, thick walled, dark olivaceous to black, smooth, 2-9 transverse septa, sometimes 1-4 longitudinal as well as oblique septa present, mostly constricted at the septa, measuring 9.5-96  $\mu\text{m}$  long, 7-15  $\mu\text{m}$  at the broadest region, beak paler than rest cells, upto 5  $\mu\text{m}$  in diameter, rostrate.

On living leaves of *Datura metel* Linn (Solanaceae) September 1999, Kotkhera, Sarra, Range, Nauradehi (W.L.S.), South Sagar Forest Division, M.P. India, leg. S.N. Tripathi, S.N. Herb No. SNR 261 holotype HClO 43,891.

Morphological and physiological studies of *Alternaria alternata* causing leaf spot disease of Chilli (*Capsicum annum*)<sup>3</sup>. Studies on some hyphomycetes fungi from central India<sup>6</sup>.

A detailed study of the literature on different *Alternaria* species on family Solanaceae revealed three species comparable with the species in question (Table 1). It is also to be noted that *A. alternata*, are described on the very host genus *Datura*, *A. solani* Soraver is reported on family Solanaceae<sup>3</sup>. A critical analysis to the table reveals that *A. solanacearum* has longer but thinner conidiophores. The conidial length shows its distinct identity while conidial width may be a little bit comparable to *A. alternata*. The observation merits its description and illustration as a new taxon of species rank.

## Conclusion

It is concluded from study that identification of a new species of hyphomycetes fungi *Alternaria solanacearum* sp.nov on living leaves of *Datura metel* found in Kotkhera, Sarra, Range, Nauradehi (W.L.S.), South Sagar Forest Division, M.P. India.

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