

# GENUS ALTERNARIA ASSOCIATED WITH SOME WEEDS IN CENTRAL INDIA

G.M.Shrivastava, R.C.Rajak & A.K.Pandey  
Dept. of bioscience R.D. University, Jabalpur (India)

**ABSTRACT:** Present work was carried out to explore the mycoflora of Madhya Pradesh associated with weeds to find new and improve sources of pest management. Frequent surveys of different plant communities in Madhya Pradesh, Genus *Alternaria* was the most dominating genus represented by six species from different hosts. *Alternaria alternata* was isolated from 12 different hosts and three of them are new host to it. *A. dianthii* showed significant herbicidal potential against 10 weeds and 8 of them are new host to it. *A. brassicae*, *A. solani*, *A. triticina*, *A. tenuissima*, are pathogenic only on two hosts which are new host record.

**KEYWORDS:** Mycoflora, Central India.

## INTRODUCTION

Un described fungi can be a massive potential resource for enzyme, antibiotic compound, secondary metabolites, and need to realize the significance of fungi as a herbicides. Present work undertaken to explore some weed pathogenic fungal diversity.

Systematic and periodical mycological survey undertaken in various forest of Madhya Pradesh, authors came across to collect some New host combination of Genus *Alternaria*. some new host combination of *Alternaria alternata*, *Alternaria brassicae*, *Alternaria dianthii*, *Alternaria solani*, *Alternaria tenuissima*, *Alternaria triticina* with some prominent weeds of Madhya Pradesh are described in this paper.

## MATERIALS AND METHODS:-

Frequent surveys of different plant communities in Madhya Pradesh were made to collect specimens. Attempts were made to visit each habitat every 2-3 year during ten years (2000-2010). In the laboratory each infected part of plant was first examined carefully<sup>1</sup>.

For the identity of fungi their slide were studied under high magnification of compound microscope. The identification and description of fungi were made with the help of various books, monographs<sup>2-3</sup> and reviews published in standard journals<sup>4-12</sup>.

The fully dried and pressed host specimens were kept in Mycological Herbarium<sup>13,14</sup> of Dept of Biological Sciences, R.D. University, Jabalpur.

Culture were serially arranged and deposited in "Fungal Germplasm Collection Centre", Dept. of Biological Sciences, R.D. University, Jabalpur.

## OBSERVATION AND DESCRIPTION:-

*Alternaria alternata* [Fr.] Keissler, Beih. Bot. Zbl., 29: 434 (1912) *Torula alternata* Fries Syst. mycol., 3: 500 (1832). *Alternaria tenuis* C.G. Nees, Syst. Pilze Schwamme: 72 (1816-17).

**Morphological Description:** Colonies on PDA medium at 28±1°C dark brown to black, with abundant, profusely branched, septate mycelium; conidiophores, mononematous, macronematous, simple unbranched, straight to flexuous, pale olivaceous, brown, smooth with prominent conidial scars; 7.6-151.2 x 3.7-7.5µm; conidia formed in long chains, obclavate, ovoid or ellipsoidal pale to mid brown, many transverse and longitudinal septa with short cylindrical beak, pale brown pore at tip, 11.3-78.3 x 7.5-15.2µm (Fig. 3.2).

1. *Ipomoea carnea* Jacq. :- The diseased appeared as light brown semicircular spots at any part of the leaf. Spot enlarged rapidly became irregular surrounded by yellow halo. Central region became light brown. The halo increased rapidly beyond the necrotic region. More than 80-85% damage due to FGCC # 603. Infected leaves finally fall down.

Isolated from the living leaves of the weed collected from Betule, 23-8-2003, FGCC # 603, HDBJ – GM-17, Leg. G.M.Shrivastava. **It is new host record from India.**

2. *Sida acuta* Brum. f. :- Symptoms appeared as small lesion at any part specially the tip and margin of the leaves, Which was followed by rapid yellowing and browning of infected tissues. At advance stage when high humidity prevailed the numbers and size of spots got increased rapidly and blighting of leaf took place and finally the leaves became fell down. The fungus was responsible for 70-75% damage to the plant.

Isolated from the living leaves of *Sida Acuta*, Jabalpur, FGCC # 470, HDBJ – GM-388, Leg. G.M.Shrivastava. **It is a new host record from India.**

3. *Tephrosia purpurea* L. :-The spots appeared as light brown pinhead lesions at the tip of the leaf. Spot became irregular with age and the central region turned dark brown. The fungus was responsible for more than 50-55% damage to leaves.

Isolated from the living leaves of *Tephrosia Purpurea*, Jabalpur, 17-11-2002, FGCC # 503, HDBJ – GM-403, Leg. G.M.Shrivastava.

**It is a new host record.**

*Alternaria brassicae* (Berk.) Sacc., *Michelia*, 2 : 129. 1880 *Macrosporium brassicae* Berk., 1836, in *Smith's Engl. Fl.*, 5, pt. 2: 339.

**Morphological Description:** Colonies amphigenous, effuse, rather pale olive, hairy, the individual large conidia plainly seen under a binocular dissecting microscope. Mycelium immersed; hyphae branched, septate, hyaline, smooth, 4-8µm thick. Conidiophores arising in groups of 2-10 or more from the hyphae, emerging through stomata, usually simple, erect or ascending, straight or flexuous, more or less cylindrical but often slightly swollen at the base, septate, mid-pale grayish olive, smooth, up to 170µm long, 6-11µm thick, bearing one to several small but distinct conidial scars. Conidia solitary or occasionally in chains of up to 4, acropoleogenous arising through small pores in the conidiophore's wall, straight or slightly curved, obclavate, rostrate, with 6-19 (usually 11-15) transverse and 0-8 longitudinal or oblique septa, pale or very pale olive or grayish olive, smooth or, infrequently, very inconspicuously, 75-350µm long and usually 20-30µm (sometimes up to 40µm) thick in the broadest part, the beak about 1/3 to 1/2 the length of the conidium and 5-9µ thick (Fig. 3.3).

**Specimen examined:** - The pathogen was responsible for severe leaf spot disease in the following weeds hosts

1. *Ipomoea carnea* Jacq. : -The disease was initially characterized by appearance of small circular to semicircular spots on any part of leaf. Central region of the spot became black to brown surrounded by yellow halo. Severely infected leaves became curled and finally fell down. During rainy season, the incidence was very high in natural conditions and more than 90 % damage was recorded.

Isolated from living leaves of *Ipomoea camara*, Narshingpur, 2-2-2003, FGCC # 536, HDBJ # GM-136, Leg. G.M.Shrivastava.

**It is a new host record from India.**

2. *Lantana camara* L. : -Disease was Initially characterized by appearance of light brown to dark brown irregular spots at the margins which were rapidly spread and covered the entire lamina at later stage. At advanced stage infected leaves became shredded and defoliation of younger leaves were takes place. During rainy season, the incidence was very high in natural conditions and more than 80 % damage was recorded.

Isolated from living leaves of *Lantana camara*, Sihora, 13-1-2002, FGCC # 534, HDBJ # GM-134, Leg. G.M.Shrivastava.

**It is a new host record from India.**

*Alternaria dianthii* Stevens & Hall, *Bot. Gaz.*, 47: 409-413, 1909.

**Morphological Description:** Colonies on PDA medium at 28±1°C dark brown to black, cottony, effuse with abundant, septate, branched, smooth, dark brown to black mycelium, conidiophores mononematous, macronematous, simple, unbranched, flexuous, more or less cylindrical to mid brown, 11.4 -132.5 x 3.8 -7.6 µm, conidia straight or slightly curved, conical to obclavate, smooth, 1-6 longitudinal and 1-7 transverse septa, 22.7 - 86.9 x 7.6-22.7 µm (Fig. 3.4).

**Specimen Examined:** - The fungus incites moderate to severe infection in the following hosts:-

1. *Alternanthera sessilis* (L.) R.Br. ex Dc. : -

The fungus incited leaf spot disease. The disease was characterized by several small, circular, light brown to dark brown spots appeared abundantly on leaf. At advanced stage they coalesced rapidly forming larger and irregular spots. Central tissues became necrotic and separated out from healthy tissue forming shot holes. Spots were surrounded by dark yellow halo. About 60% leaves were found infected and the total damage caused to the leaves ranged from 30-35%.

Isolated from living leaves of *Alternanthera sessilis*, Dindori, 26-10-2001, FGCC # 576, HDBJ #GM-176, Leg. G.M.Shrivastava.

**It is a new host record from India.**

2. *Amaranthus spinosus* L. : -

The fungus incited severe leaf spot disease in the plant. The disease appeared initially as small, black, and circular to irregular spots on the upper surface of the leaf. At The advanced stage spots spread rapidly covering the whole surface. During high moisture condition, the incidence was as high as 90% and most of the leaves became necrotic and fell down.

Isolated from living leaves of *Amaranthus spinosus*, Rewa, 29-8-2002, FGCC # 445, HDBJ # GM-45, Leg. G.M.Shrivastava.

**It is a new host record from India.**

3. *Argemone mexicana* L. : -

The disease initially appeared as small, circular lesions on leaves alternating with points of insertion of the bracts on the receptacle. At advanced stage leaves became severely rotted and shredded. The disease incidence was very higher (80%) when moderate moisture was available.

Isolated from Leaves of *Argemone mexicana*, Sedhi, 30-8-2002, FGCC # 539, HDBJ # GM -139, Leg. G.M.Shrivastava.

**It is an additional host for *A. dianthii*.**

**4. *Cassia tora* L. :-**

The fungus incited leaf spot disease. Infection started from the tip of the leaf as light brown necrotic spots gradually extending rapidly to the base. The necrotic zones of the leaves were quite distinct from the diseased one by the presence of a well-defined yellow halo. The infected portion finally dried bearing small, minute fruiting bodies. During rainy season incidence was as high as 50%.

Isolated from living leaves of *Cassia tora*, Dendori, 17-11-2002, FGCC # 617, HDBJ # GM-217, Leg. G.M.Shrivastava.

**This is a new host record from India.**

**5. *Euphorbia hirta* L. :-**

The fungus incited leaf spot disease. The infection first appeared as purple to brownish amphigenous spots, which were characteristically angular to irregular and marked by veins. The leaf spots gradually progressed upwards. Severely infected leaves become defoliated prematurely due to heavy infection. The disease was as highly as 70%.

Isolated from living leaves of *Euphorbia hirta*, Mandla, 23-8-2002, FGCC # 408, HDBJ# GM-08, Leg. G.M.Shrivastava.

**It is a new host record from India.**

**6. *Ipomoea carnea* Jacq. :-**

The fungus incited severe leaf spot disease in the plant. The disease appeared initially as small, black spots on the margin of the leaf. At the advanced stage spots spread rapidly and involved major part of the leaves. Yellowing of leaves took place at much beyond the necrotic region. During high moisture condition, the incidence was more than 50% and infected leaves became necrotic and fell down

Isolated from living leaves of *Ipomoea carnea*, Mandla, 8-7-2002, FGCC# 533, HDBJ # GM-133, Leg. G.M.Shrivastava.

**It is a new host record from India.**

**7. *Lantana camara* L. :-**

The fungus incited leaf spot disease. Infection started from the tip of the leaves as light brown spots gradually extending rapidly to the base. The necrotic zones of the leaves were quite distinct from the diseased one by the presence of a well-defined yellow halo. The infected portion finally dried bearing small, minute fruiting bodies. During rainy season incidence was more than 50%.

Isolated from living leaves of *Lantana camara*, Rewa, 30-8-2002, FGCC # 531, HDBJ # GM131, Leg. G.M.Shrivastava.

**It is a new host record from India.**

**8. *Sesamum indicum* L. :-**The fungus incited leaf spot disease. The infection was started from the margin as well as along with veins as small dark brown spots extending rapidly towards the mid portion. At advance stage leaf stalks were also infected and sometime leaf became fell down. The incidence was about 70%.

Isolated from living leaves of *Sesamum indicum*, Balaghat, 26-12-2002, FGCC # 590, HDBJ # GM-190, Leg. G.M.Shrivastava.

**It is a new host record from India.**

*Alternaria solani* Sorauer, *Z. pfl krankh.* 6 : 6; 1896.

*Macrosporium solani* Ellis & Martin, 1882, *Am. Nat.*, 16 : 1003.

**Morphological Description:** - Conidiophores arising singly or in small groups, straight or flexuous, septate, rather pale brown or olivaceous brown, up to 110 $\mu$  long, 6-10 $\mu$  thick. Conidia usually solitary, straight or slightly flexuous, obclavate or with the body of the conidium oblong or ellipsoidal tapering to a beak which is commonly the same length as or rather longer than the body, pale or mid pale golden or olivaceous brown, smooth, overall length usually 150-300 X 15-19 $\mu$ m thick in the broadest part, with 9-11 transverse and 0 or a few longitudinal or oblique septa; beak flexuous, pale, sometimes branched, 2.5-5 $\mu$ m thick tapering gradually (Fig. 3.5).

**Specimen Examined:** -

**1. *Lantana camara* L. :-**

The fungus incited leaf spot disease. The disease was initially characterized by appearance of several small, circular, light brown to dark brown spots on leaf surface. At advanced stage they coalesced rapidly forming larger and irregular spots. Colonies of the fungus appeared on necrotic tissues Central tissues became necrotic and separated out from healthy tissue forming shot holes. Spots were surrounded by dark yellow halo. About 60% leaves were found infected and the total damage caused to the leaves ranged from 30-35%.

Isolated from living leaves of *Lantana camara*, Mandla, 23-8-2002, FGCC # 575, HDBJ # GM-175, Leg. G.M.Shrivastava.

**It is a new host record from India.**

**2. *Sida acuta* Burm. f. :-**

The fungus incited leaf spot in the host plant. The spots were amphiphylous, first circular later became irregular, grayish brown, surrounded by a yellow halo, few,

separate, not coalesced, somewhat sunken, 2-6 mm. in diam. At advanced stage leaves defoliate. During survey it was observed that the disease was abundant in almost all the areas surveyed. It caused considerable losses (90%).

Isolated from living leaves of *Sida acuta*, Balaghat, 26-12-2002, FGCC # 595, HDBJ # GM -195, Leg. G.M.Shrivastava.

**It is a new host record from India.**

*Alternaria tenuissima* (Kunze ex pers.) Wiltshire, *Trans. Br. Mycol. Soc.*, 18: 157 (1933)

*Helminthosporium tenuissimum* Kunze, *Nava Acta Acad. Caesar Leop. Carol.* 9: 242 (1818), *Mycelia. Eur.*, 1: 18 (1822)

*Macrosporium tenuissimum* Fr. *Syst. mycol.*, 3 : 374 (1832)

**Morphological Description:** Conidiophores solitary or in groups, simple or branched, straight or flexuous, more or less cylindrical, septate, pale or mid pale brown, smooth, with 1 or several conidial scars, up to 115µm long, 4-6µm thick; conidia solitary or in short chains, straight or curved, obclavate or with the body of conidium ellipsoidal tapering gradually to the beak which was up to half the length of the conidium, usually shorter, sometimes tapered to a point but more frequently swollen at the apex where there may be several scars, pale to mid brown, usually smooth, sometimes minutely verruculose, generally with 4-7 transverse and several longitudinal or oblique septa, slightly or not constricted at the septa overall length 22-95 µm, 8-19 µm thick in the broadest part; beak 2-4µm thick, swollen apex 4-5 µm wide (**Fig. 3.6**).

**Specimen examined: -**

**1. *Lantana camara* L. :-**

Disease appeared as small lesion on the leaf margin. At advanced stages spots turned dark brown. Necrotic area was surrounded by pale yellow halo. Spots increased in size and coalesced to each other forming large lesions. Leaves became dried and curled and finally fell down. Moderate incidence was recorded during survey. More or less similar symptoms were also observed during Pathogenicity test under controlled conditions.

Isolated from living leaves of *Lantana Camara*, Balaghat, 29-12-2002, FGCC # 538, HDBJ # GM-138, Leg. G.M.Shrivastava.

**It is a new host record from India.**

**2. *Sida acuta* Burm. F. :-**

The disease initially appeared as small, amphotigenous scattered, pale brown spots on any part of the leaf, more prominent on the upper surface of leaf. Chlorotic zones were surrounded by a light brown halo. The spots were coalesced rapidly to each other and formed larger spots. At advanced stage central tissues became necrotic and

detached at maturity and formed holes. Moderate severe infection was recorded during survey.

Isolated from living leaves of *Sida acuta*, Katni, 21-12-2002, FGCC # 410, HDBJ # GM- 10, Leg. G.M.Shrivastava.

**It is a new host record from India.**

*Alternaria triticina* Prasad & Prabhu, *Indian Phytopath.* 15 : 292-293, (1963).

**Morphological Description:** Colonies on PDA medium at 28±1°C dark brown to black, effuse, mycelium partially immersed; conidiophores olivaceous brown, occasionally branched, 25-X 3-6 µm; conidia solitary or in short chains, obclavate, golden brown, Smooth walled, with 4-7 transverse and longitudinal or oblique septa, 20-90 X 9-30 µm, and beak shorter than or of the same length as the body, cylindrical, 3-5 µm thick (**Fig. 3.7**).

**Specimen Examined: -**

**1. *Lantana camara* L. :-**

The disease was characterized initially by the appearance of several small irregular, black to brown spots on lamina. At advanced stages dark brown spots appeared at both the surface of leaf. Severely infected leaves became curled and finally fall down. Severe rotting of inflorescence and seeds were also observed at high moisture. During rainy season, the incidence was very high in natural conditions and more than 90 % damage was recorded.

Isolated from living leaves of *Lantana camara*, Narshingpur, 12-11-2002, FGCC # 602, HDBJ # GM - 202, Leg. G.M.Shrivastava.

**It is a new host record from India**

**2. *Sesamum indicum* L. :-**

The disease initially appeared as several small pale yellow spot on the upper surface of lamina. At high moisture levels the spots were enlarged and coalesced rapidly, involved larger areas of leaves. . At later stage the leaves became curled and turned brown in colour. Moderate incidence was recorded in field.

Isolated from living leaves of *Sesamum indicum*, Baster, 10-1-2001, FGCC # 416, HDBJ # GM-16, Leg. G.M.Shrivastava.

**It is a new host record from India.**

**ACKNOWLEDGEMENT**

We are thankful to the Head of the Department of Biological Sciences, R.D. University Jabalpur for providing laboratory facilities. Financial assistance from the Department of forest and Environment, New Delhi. Are also thankfully acknowledged.



REFERENCES

1. Agarwal, G.P. and Hasija. S.K. (1986). Microorganisms in the laboratory. A laboratory guide for Mycology, Microbiology and Plant Pathology. Print House, Lucknow (India). 155 P.
2. Barnett, H. L. and Hunter, B. B. (1972). Illustrated Genera of Imperfect Fungi. Bergees Publishing Company. Minneapolis, Minnesota 241pp.
3. Ellis, M.B. (1971) Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, kew, surrey, England. pp. 608.
4. Agarwal, G.P. (1961). Fungi causing plant diseases at Jabalpur (M.P.)- III. *J. Indian Bot. Soc.* 40: 404 – 408.
5. Agarwal, G.P. and Hasija, S.K. (1961) Fungi causing plant diseases at jabalpur (M.P.)-VI. Some *Cercospora*. *Proc. Nat. Acad. Sci. India.* 31:355-359.
6. Bilgrami, K.S., Jamaluddin and Rizwi, M.A. (1979) Fungi of India part- I List and References, Today and Tomorrow's printers and publishers New Delhi pp. 467.
7. Bilgrami, K.S., Jamaluddin and Rizwi, M.A. (1981) Fungi of India part- II Host index and addenda, Today and Tomorrow's printers and publisher. New Delhi and Tomorrow's printers and publisher, New Delhi pp. 128.
8. Bilgrami, K.S., Jammaluddin and Rizwi, M.P. (1991). Fungi of India. Part III Today's & Tomorrow's Printers and Publishers, New Delhi 798pp.
9. Pandey, S. K. (2000). Mycoherbicidal potential of some fungal pathogens for the management of *Lantana camara* L., *Ph. D Thesis.*, R. D. University, Jabalpur. India.
10. Pandey, S. K. and Pandey A.K. (2000). Mycoherbicidal potential of some fungi against *Lantana camara* L.: A Preliminary observation. *J. Trop. Forest.* 16: 28-32.
11. Barreto R.w., Evans H.C. and Ellison C.A. (1995) The mycobiota of the weed *Lantana camara* in Brazil, with particular reference to biological control. *Mycol Res.* 99(7): 767 – 782.
12. Sarabhoy, A. K., Agrawal D. K. and Varshney J. L. (1986) Fungi of India (1977-1981). Associated publishing company; New Delhi India 271 pp.
13. Hawksworth, D. K. (1974). *Mycologist's Hand Book*, CMI Kew, England.
14. Savile, D.B.O.(1968). *Collection and Care of Botanical Specimens*. Publ. can Dept. Res. Br. 1113.