

flora and fauna

An International Research Journal of Biological Sciences



NAAS RATING : 2.02

Scientist Unique Researchers Yare Association
Website : www.floraandfona.org

NEW SPECIES OF STIGMINA FROM INDIA

S. A. FIRDOUSI

Department of Botany,
H. J. Thim College of Arts and Sciences,
JALGAON (M.S.) INDIA

Received : 3.2.14; Revised : 8.3.14; Accepted : 9.4.14

ABSTRACT

A new species of *Stigmina Lannae coromandelica* (Houtt.) Morr is described here. It was compared with known species of the host family Anacardiaceae. It was identified by CAB International Mycological Research, Kew, England.

Figures : 03

References : 03

Table : 01

KEY WORDS : Conidia, Conidiophore, Hyphae, *Lannae coromandelica*, *S. anacardii*, *S. pallida*, *S. pulvinatis*, *Stigmina*, Stroma,

Introduction

Stigmina is a Dematiaceous Hyphomycetes fungi and belongs to Cercospora allied complex group. Stumpy and rosette type of conidiophore with annelation are its generic character. *Stigmina lannae* sp. nov. was found for the first time on this host, *Lannae coromandelica* from the forest of Sagar (M.P.). It is a host specific fungus. Being a host specific nature and having some distinguishing taxonomic characters, this species is treated as a new species.

This species of *Stigmina* was compared with other species of *Stigmina* reported in the host family Anacardiaceae. This species has its own distinguishing character. Hence this species is new to science.

Material and Methods

In order to collect phytopathogenic fungi, a frequent survey was made in the forest of Sagar (M.P.)

1. A leaf spot disease of *Lannae coromandelica* (Houtt.) Morr (Anacardiaceae) was collected from the forest of (M.P.).
2. The symptomology and other information such as place of collection, locality, local name of the plant and date of collection were noted.
3. The sample was kept in the polythene bag and brought in the laboratory.
4. In the laboratory, host name was confirmed with

the help of herbarium, Dept of Botany, Sagar, (M.P.).

5. Scrap mount was prepared from the infected portions in the lactophenol and glycerine. Tentative identification was done with the help of monographs, books and Mycological papers.
6. A specimen was sent to IMI, Kew, London, England, for confirmation.
7. Isotype FV-84, IMI-323383, Holotype.

Stigmina lannae sp. nov.

Infection spots amphigenous, small to large, irregular, coalescing to cover almost whole leaf surface, brown, mostly vein limited, colonies, hypophyllous, punctiformis, brown, mycelium hyphae immersed, narrow, septate and branched; stromata well developed, partly immersed and partly erumpent, pseudoparenchymatous, mid olivaceous 20-90 mm in diameter; conidiophore caespitose, densely packed together forming pulvinate; sporodochia macromematous, usually short to stumpy, erect to suberect, straight to flexous mostly aseptate (continuous) unbranched, smooth walled light olivaceous 3.0-60 x 2-8 mm; conidiogenous cells integrated, terminal, monobalastic, percurrent, cylindrical; conidia, simple, solitary-dry, acrogenous, light olivaceous, cylindrical to obclavato-cylindrical, straight to curve, smooth walled, 15-88 x 2-6 mm septate, apices acute to obtuse, with subtruncate, to

Leaves of *Lannea coromandelica* (houtt.) Morr

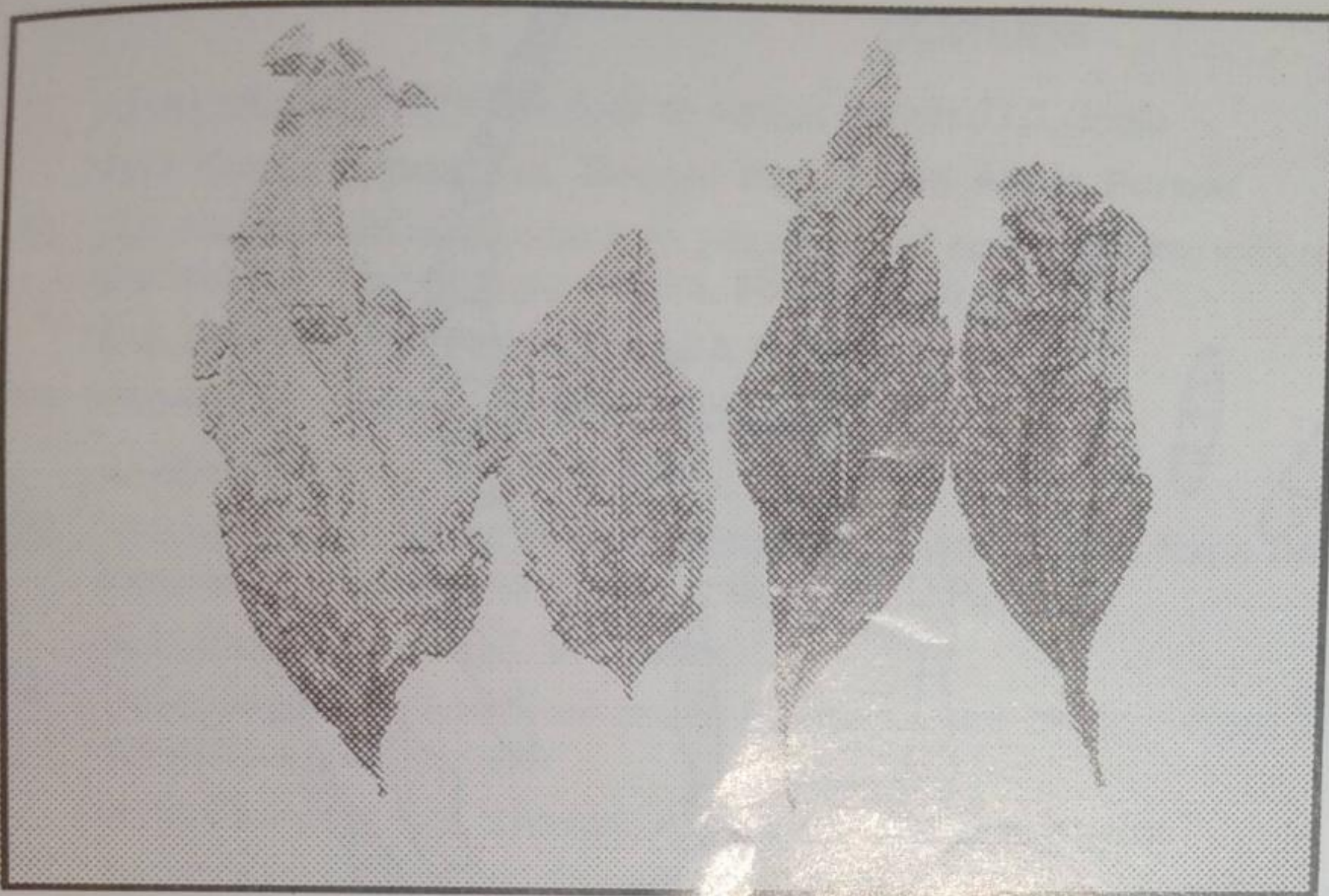


Fig. 1 : Infected Leaves

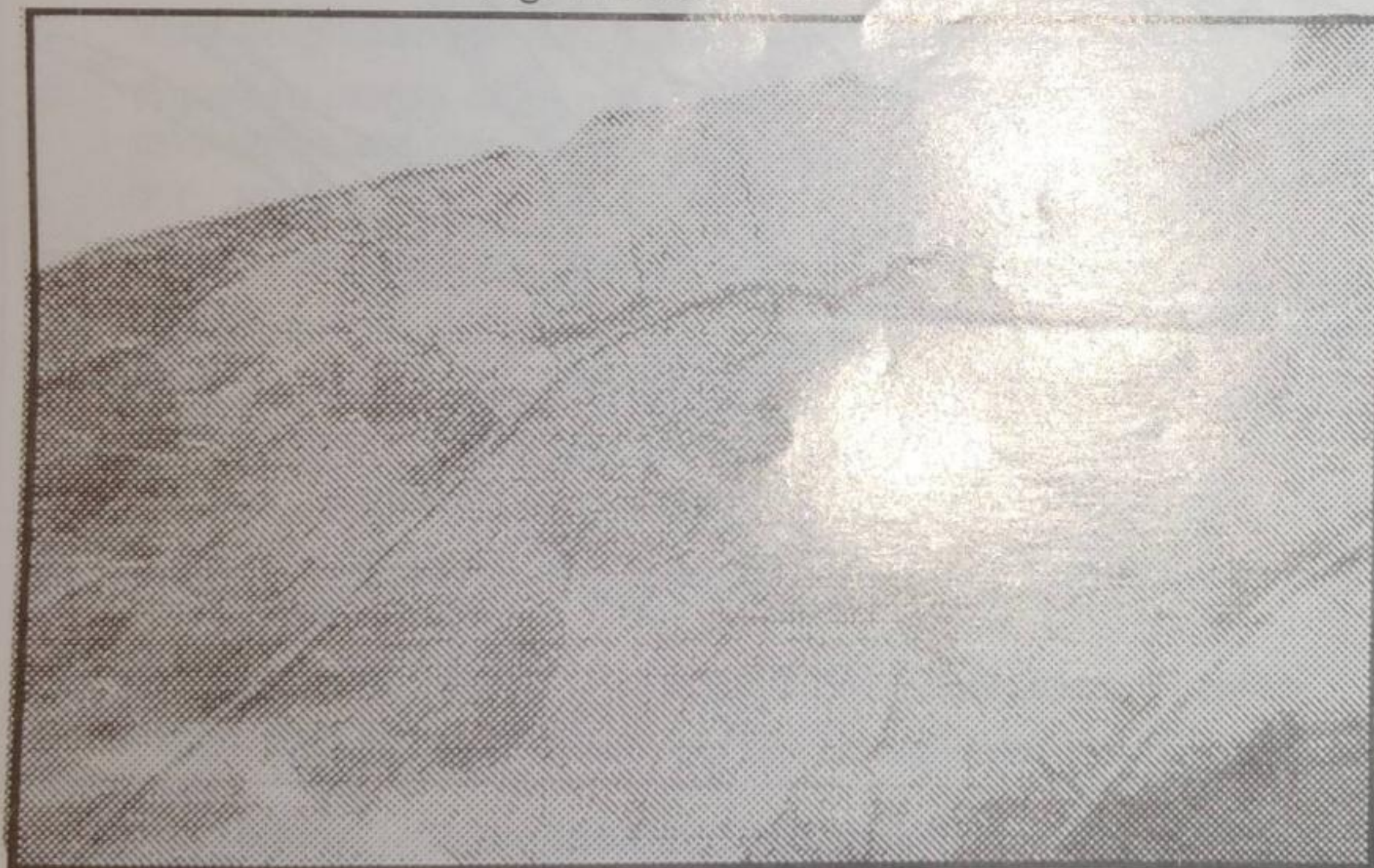


Fig. 2 : Ventral view of leaves

TABLE-1 : Comparative account of *Stigmina lannae*, Sp. nov , *S. anacardii*, *S. palviformis* and *S. pallide*.

	Stroma	Conidiphore	Conidia
<i>Stigmina lannae</i> (sp. nov)	20-90 μ m	3-60x2-8 μ m	15-88x2-6 μ m
<i>S. anacardii</i>	10-110 μ m	3-20 μ m 3 annelation	3-55x4-8 μ m
<i>S. palviformis</i>	200 μ m	15-40 x 4-8 μ m 13 annelation	2.4-40 x 9-13 μ m
<i>S. pallide</i>	500 μ m	8-30 x 6-11 μ m 6 annelation	4-48 x 1.6- 19 μ m

obconicotruncate bases, hila unthickened.

On living leaves of *Lannea coromandelica* (Houtt.) Morr. (Anacardiaceae); March (1990); (Gopalpura South Forest Division Sagar) FV-84, isotype, IMI 323383, Holotypes.

Of all the *Stigmina* species described so far particularly on the host family (Anacardiaceae), the authors collections has its own distinct identity in having shorter stroma, larger conidiphore and larger conidia as against those of *S. anacardii*, *S. pulviformis* and *S. pallide*^{1,2}. Stroma of *S. lannae* is shorter of all of them, conidiphores are largest and the annelations are 0-3 but in other cases 0-4, or 0-13 and 3. The size of the conidia are largest and guttulate cylindrical to obclavate cylindrical but on the other hand the conidia of three species are cylindrical.

Hence on the basis of above discussion the present taxon warrants description as a new species.

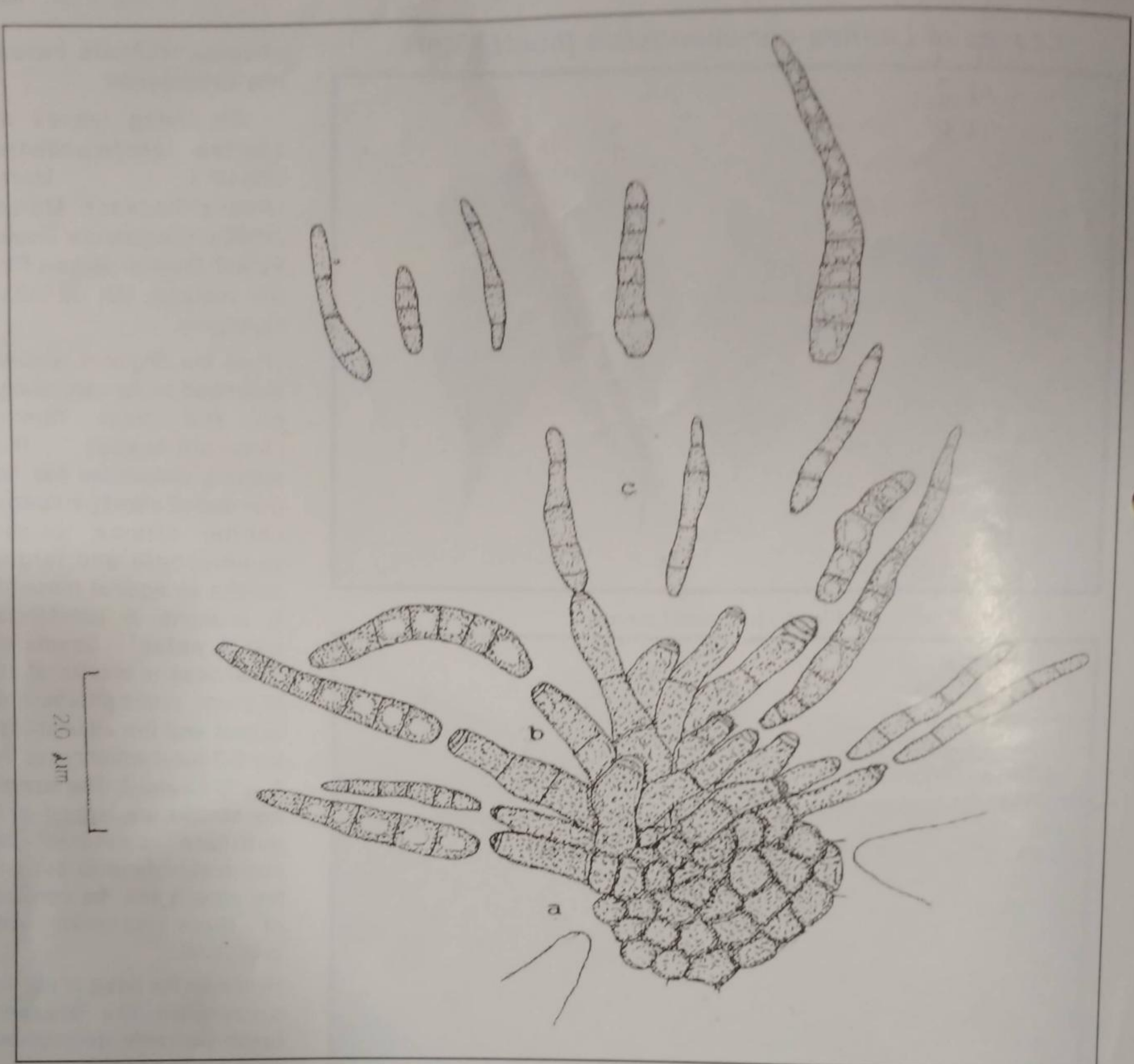


Fig. 3 : *Stigmata lanneae* sp. nov. a = Stroma, b = Conidiophore, C= Conidia

References

- 1 ELLIS M. B. (1971) Dematiaceous Hypomycetes Vol. VIII, Myco-paper 111 1-46. CMI Kew England
- 2 ELLIS M. B. (1976) More Dematiaceous Hypomycetes CMI Kew England
- 3 JAMALUDDIN, RIZVI AND BILGRAMI (2008) Fungi of India host Index and Addenda, Bisen Pal Singh Publication, Dehradun

CONTENTS

1. Fruit structure as taxonomic marker in the species *Chaenactis fremontii* of the tribe Chaenactideae (Asteraceae) 03-07
Bidyut Kumar Jana and Sobhan Kr. Mukherjee
2. Biodiversity of phytoplankton in makhana swamps of north Bihar, India 08-10
Ashok Kumar Jha and Chandra Bhanu Singh
3. Management of chickpea wilt: a review. 11-14
Jyoti Srivastava, S.K.Dwivedi and K.P. Kamthan
4. Seasonal occurrence of *Comstockaspis perniciosus* (California scale) (Hemiptera: diaspididae) a scaly insect of *Abutilon indicum* (Linn.) 15-18
Atul Tiwari and A. K. Singh
5. Distribution and severity of paddy blast disease in Bundelkhand and Gird zone of Madhya Pradesh, India 19-21
Anil Kumar Singh, Jitendra Kumar Babele and Bhupendra Kumar Singh
6. Comparative evaluation of antioxidant activity of aqueous and alcoholic extracts of *Ocimum sanctum* Linn. leaves 22-24
Navi Ranjan and Manorma Kumari
7. Effect of time of budding in vegetative propagation of aonla (*Emblica officinalis*, Gaertn) cv.na-6. 25-27
Vandana Mishra and M. M. Pandey
8. New species of stigmata from India 28-30
S.A. Firdousi
9. Comparative efficacy of alcoholic and water extracts of certain angiosperms against wilt of linseed 31-36
Udai Bhan Singh and K. P. Kamthan
10. Diversity and frequency of zoosporic aquatic fungi in Baghain river of Bundelkhand region (U.P.) India. 37-43
Lavkush Vishwakarma and Rajesh Kumar Srivastava
11. Prospective of leaf extracts against pathogenic fungi of sorrel (*Rumex acetosa* L.) 44-48
U.N.Bhale
12. Preparation, evaluation and keeping quality assessment of flavored aonla candy 49-62
Rashmi Shukla, Nitin Soni, M. K. Kureel and Y. K. Shukla
13. Participatory forest development and management in the Shahabad region of Rajasthan state, India 63-71
M. K. Tiwari, N. Soni, D. K. Patidar, and Paul Veldman
14. The control of sugarcane top borer : *Tryporyza (Scirpophaga) nivella* Fab. by a granular pesticide; furadan-3g (carbofuran) 73-76
Praveen Kumar and K.S. Rana
15. Comparative analysis of the microbial load in cat fish (*Mystus aor*) and carp fish (*Labeo bata*) from Gomti river, Lucknow, India 77-82
Sharad C. Srivastava, Pankaj Verma and Madhu Tripathi
16. Morpho-taxonomic study of a new tapeworm, *Pseudobatrachus ramdeviensis* n. sp. from *Heteropneustes fossilis* (bloch) from Bundelkhand region, Uttar Pradesh 83-90
Aditya Narayan, Lakhan Singh, Abha Raj Singh and A.K. Srivastav

Vol. 21 No.2, 2015

ISSN 0973-692

flora and fauna

An International Research Journal of Biological Sciences



NAAS RATING : 2.02

Scientist Unique Researchers Yare Association
Website : www.floraandfona.org

TWO NEW FUNGAL DISEASES OF TREES OF MANUDEVİ FOREST OF JALGAON, DISTRICT

S. A. FIRDOUSI AND TANVEER A. KHAN

Department of Botany,
H. J. Thim College of Arts and Science,
Mehrun, JALGAON-425001
tanveerkhan04@gmail.com

Received : 22.7.15; Accepted : 19.9.15

ABSTRACT

During the forest fungal diseases survey of the Jalgaon, authors came across very serious diseases on two important trees which have great economic and medicinal importance. A leaf spot disease on *Bridelia retusa* L. (Euphorbiaceae) caused by *Colletotrichum gloeosporioides* Penz. Another leaf disease on *Morinda citrifolia* L. (Rubiaceae) caused by *Corynospora* sp. These were identified in laboratory and confirmed by experts of Agharkar Research Institute, Pune. The disease symptoms starts in the month of July and remain upto October. These tree hosts are reported as new host for these fungi. Hence, these diseases are reported for not only from Khandesh region but from India. It can be said that these disease are new to science.

Figures : 06

References : 03

Table : 00

KEY WORDS : *Bridelia retusa*, *Colletotrichum gloeosporioides*, Leaf spot, *Morinda citrifolia*

Introduction

The Manudevi forest is a Tropical, dry deciduous types. The vegetation varies with the changes in altitudes aspect and rainfall. There are various subtypes of the forest in this area. In the Manudevi forest there are a number of the parasitic fungi causing various types of the foliage diseases in the forest trees in this area.

Total Geographical area of Jalgaon is 11765 sq.kms and the total forest area is 1991 sq.kms. The Manudevi forest lies on the Satpuda range in the Jalgaon District. It is about 60 kms away from the Jalgaon city. It is in continuation with Pal wild life sanctuary. The forest is tropical dry deciduous and have various trees, shrubs and herbs. It is about 700 mtrs. above the mean sea level and lies between 20-10 and latitudes and 75-25 E longitudes. The climate is variable.

Fungi play important role in the infection of the foliage part of the plant and causing the great loss. Many diseases like leaf spot leaf blight, margin infection, short whole formation and rust. They

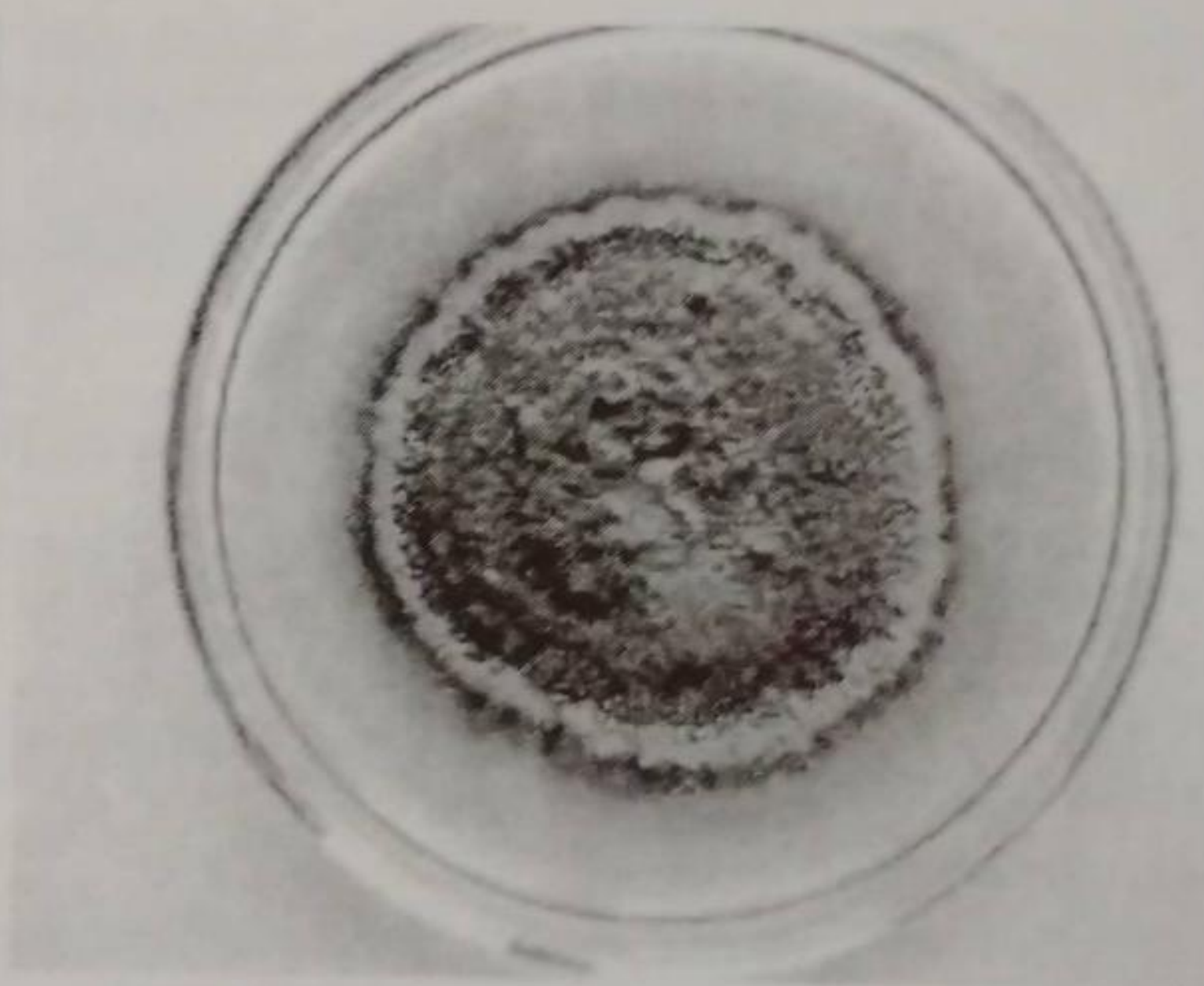
cause early leaf fall. Most of the fungi are follicolous fungi belonging to *Cercospora* allied complex. They infect both the surface of leaf, petiole and stem.

Material & Methods:

In order to collect phytopathogenic fungi, a frequent survey was made in the forest of Manudevi.

1. A leaf spot disease of *Bredia retusa* (*Euphorbiaceae* and *Morinda citrifolia* L. were collected.
2. The symptomlogy and other information such as place of collection, locality, local names of the plant and date of collections were noted.
3. The sample was kept in the polythene bag and brought in the laboratory.
4. In the laboratory, host name was confirmed with the help of herbarium, Dept of Botany, H.J.Thim college of Arts & science, Jalgaon.
5. Scrap mount was prepared from the infected portions in the lactophenol and glycerine. Tentative identification was done with the help of monographs, books and Mycological papers

ACKNOWLEDGEMENTS : Authors are thankful to UGC Regional office PUNE for financial support and Agharkar Research Institute for identification of the fungi

Figs. 1 & 2 : *Bridelia retusa*, Infected LeavesFig. 3 : *Colletotrichum gloeosporioides*Fig. 4 : Culture of *C. gloeosporioides*

and isolation of pathogen were done in P.D.A medium.

6. A specimen was sent to Agharkar Research Institute Pune for confirmation.
7. After confirmation the identity, camera lucida drawing and micrometry was done.
8. The taxon was described and compared with the help of available literature.

Result and Discussion

Leaf spot of *Bredelia retusa* (Figs. 1-2)

Symptoms:

This disease was regularly seen in the field on young leaf in July as small brown spot. Gradually, lesions increased covering almost leaf surface.

This was a serious problem. Young leaves were seriously affected. Sometimes shot hole formation were also seen. The seriously affected leaf showed curling and rotting..

Causal organism:

Colletotrichum gloeosporioides a facultative parasite belongs to the order, *Melanconiales* (Fig. 3). The fungus produced hyaline, one-celled, ovoid to oblong, slightly curved or dumbbell shaped conidia, 10-15 μ m in length and 5-7 μ m in width. Masses of conidia appeared pink or salmon colored. The waxy acervuli, that were produced in infected tissue, were subepidermal.

Leaf spot of *Morinda citrifolia* L.

Symptoms:

Infection source light to brown spot on the

Fig. 5 : *Corynespora* SpFig. 6 : *Morinda citrifolia*, L Infected Leaf

both sides of the leaf. Among the brown spot some water soaked symptoms were also visible. Infections remained half to full leaf (Fig. 6).

Spot was surrounded by yellow spot, infection started from September and remained upto December. Survey showed that all the trees present in the spot were infected. In the later stage fruiting body were grown only in upper surface of the leaf

Causal organism:

***Corynespora* sp.**

The underneath was grey or black (Fig.5) Conidiophores were cylindrical, straight or curved

and un-branched, 3-10 septate, smooth and pale brown. Conidia were variable in shape, isolated or forming acropetal chains, 27-192 μm long and 5-10 μm thick, with a rounded expanded truncate base, 5-14 pseudoseptate, yellowish brown and smooth

A thorough survey of literature indicated that on, *Bridelia retusa* no pathogen i.e, *Colletotrichum gloeosporioides* Penz was so far described by Indian pathologist and mycologist from any part of India. Similarly no *Corynespora* sp was reported on *Morinda citrifolia*. *Corynespora* sp is having peculiar characters and resembling to the reported sps of *Corynespora* from India.

References

1. DUBEY, R.K. AND RAI, A.N.(2003) Two new hyphomycetous fungi from India. *Indian Phytopathology* 56, 486-490.
2. JAMMALUDDIN, REZVI AND BILGRAME K.S.(2008) Fungi of India, Today and tommarow publication, New Dehli.
3. KUMAR, S., SINGH, R. AND PAL, V.K. (2007) Three hitherto undescribed species of *Corynespora* from North-Eastern Uttar Pradesh. *Journal of Basic & Applied Mycology* 6, 39-43.

CONTENTS

1. Histochemical studies on ontogeny of anther with special reference to total proteins in *Clitoria tematea* linn. 139-142
B. K. Auti
2. Effect of aqueous extracts of different parts of ethnomedicinal plants from Kinwat forest on seed germination 143-150
S.R. Shinde
3. Effect of levels and sources of sulphur on growth, yield and quality of guar (*Cyamopsis tetragonoloba*) under rainfed conditions 151-154
Chandrabhan Singh Jatav and H. K. Trivedi
4. Phytoneutraceutical therapies for stomach and related remedies in Gorakhpur District of U.P., India 155-157
Jayendra Nath Singh, Manjulla Srivastava, S.C. Tripathi and V.N. Pandey
5. Two new fungal diseases of trees of Manudevi forest of Jalgaon, District 158-160
S. A. Firdousi and Tanveer A. Khan
6. Estimation of DNA and protein of begoma virus infested chilli plant 161-164
Ramesh Chandra and Saumya Tiwari
7. Management of linseed wilt by certain essential oils 165-167
Udai Bhan Singh, S.P. Singh and K.P. Kamthan
8. Evaluation of physicochemical parameters of *Moringa oleifera* leaves 169-172
S. Goswami and R. Singhai
9. A significant effect of turpentine oil against the larvae of *Aedes alopictus* skuse 173-178
C. L. Baghel and A. K. Srivastav
10. Biosystematic studies on caryophyllidean cestode genus *Lytocestus* from freshwater catfish *Clarias batrachus* with description of new species 179-190
Vikram Satwarao Deshmukh, Sanjay Shamrao Nanware and Dhanraj Balbhim Bhure
11. On a new species of the genus *Lechriops* schonherr coleoptera: curculionidae) 191-194
P. V. Khairmode and T. V. Sathe
12. Impact on growth and reproduction of *E. foetida* in vegetable waste during vermicomposting 195-198
Ruchi Agrawal, Jyoti Sharma and Praveen Kumar
13. Impact of sub-lethal concentration of dimethoate (rogor) pesticide on alkaline phosphatase activity in gills of freshwater fish, *Catla catla* 199-202
C.A. Jawale
14. Occupancy and habitat use of sloth bear (*Melursus ursinus*) in Mukundara hills tiger reserve, Rajasthan, India 203-208
F. Sultana, S. Khan and Gulab Nabi

flora and fauna

An International Research Journal of Biological Sciences

PEER REVIEWED



UGC & DST APPROVED



NAAS RATING : 4.55



Scientist Unique Researchers Yare Association
Website : www.floraandfona.org.in

TWO NEW SEVERE LEAF SPOT DISEASE ON FOREST TREES OF JALGAON (MAHARASTRA) INDIA

S. A. FIRDOUSI

Department of Botany,
H. J. Thim College of Arts and Science,
Mehrur, JALGAON (MAHARASTRA) INDIA
Email : shakeel.talk@gmail.com

Received : 18.08.2017; Revised : 13.09.2017; Accepted : 12.10.2017

ABSTRACT

During the survey of the forest fungal disease, of Jalgaon district, two severe leaf spot diseases on *Lannea coromandelica* and (*Ougenia dalbergioides* (Papilionaceae) were observed in Jalgaon, forest during July to September 2016-17. The casual organism was identified as *Stigmata lanneae* and *Phomopsis* sp. respectively^{1-4,7}. These are first report from Jalgaon and Maharashtra state.

Figures : 02

References : 08

Table : 00

KEY WORDS : Banana, Foliar spray, Grand Naine, Micro-nutrients, Quality parameters.

Introduction

The forest of Jalgaon is a tropical dry deciduous types. The vegetation varies with changes in altitudes, topography and rainfall. There are various subtype of forest in this area. There are many parasitic fungi causing various types of foliage diseases in the forest of this area.

The geographical area of Jalgaon is 11765sq kms and the total forest area is 1991sqkms. The most of the forest of Jalgaon lies on the Satpuda range in the Jalgaon district.

The fungi play important role in various disease and responsible for great loss. Many diseases like leaf spot, leaf blight, leaf rust, shot hole, and marginal infection. They cause yearly leaf fall. Most of the fungi are follicolous belong to *Cercospora* allied complex and coelomycetes.

Lannea coromandelica (Anacardiaceae) is small to large tree found commonly in the mixed deciduous forest and used in the various ways. Its wood is used for agriculture and domestic implements. A severe leaf spot diseases was found in the forest of Jalgaon. The causal organism was

identified as *Stigmata lanneae*.

Ougenia dalbergioides, (Papilionaceae) is a small to medium sized deciduous tree growing commonly in the forest. The plant has straight to crooked trunk and produces sucker in forest and regenerate. The tree is famous for hard wood which is used in cart and building material. It is also for agriculture implement, The leaves are used for fodder.

Materials and Method

A frequent, extensive and intensive survey was made to collect the phytopathogenic fungi infecting the leaves in the different forest site of Jalgaon forest. The symptomology and other information such as place of the collection, locality, local name of the plants their families, date of collection were noted in the field diary. The sample were kept in the polythene bags and carried to the laboratories for identification. The pathogen were identified with the help of various monographs, review, books and research papers. Monograph of *Cercospora*² and dematacious hyphomycetes^{3,4}.

ACKNOWLEDGEMENTS : Author is grateful to Principal for providing laboratory facilities and HOD, Prof, A. N. Rai Deptt of Botany, Dr.H.S.Gour university for identification and confirmation of the fungi.

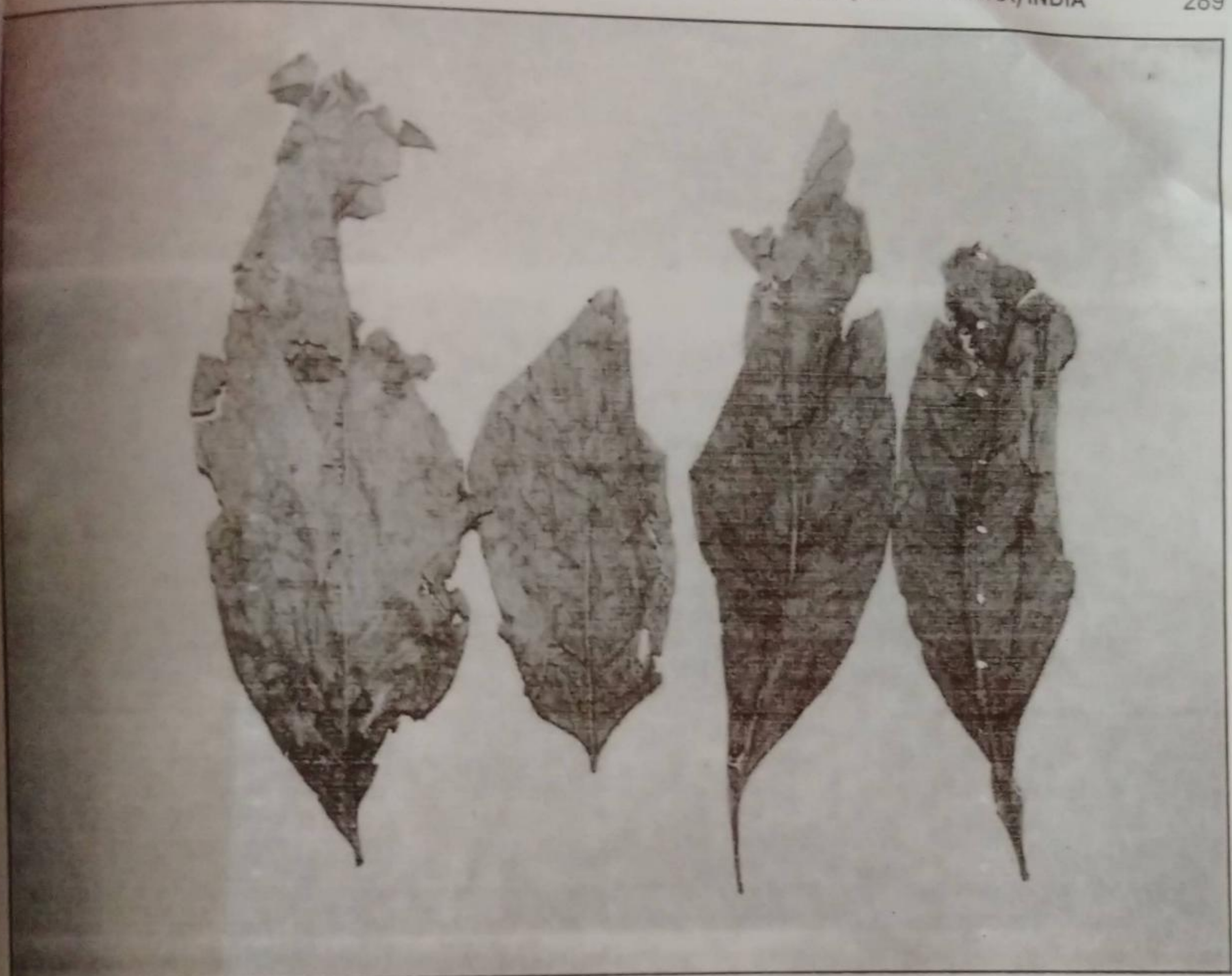


Fig. 1 : Leaf spot of *Lannea coromandlica* caused by *Stigmata lanneae*.

Result and Discussion

Leaf spot of *Lannea coromandlica* caused by *Stigmata lanneae*

The infection first appear as a small necrotic spot on the lower surface of the leaf in August and spot coalesce gradually. Spot are mostly irregular and colonies are hypophyllous.

Infection spot amphigenous, small to large, brown, mostly vein limited colonies, hypophyllous, punctiformis, mycelium immersed, narrow, septate and branched, stoma well developed, partly erumpent, pseudoparenchymatous, mid olivaceous, 20-80 mm conidiophore caespitose, densely packed, sporodochia, macronematous, short to stumpy, erect to sub erect straight to flexuous, mostly, septate, unbranched, smooth walled light olivaceous, cylindrical straight, light olivaceous, 3-60x2-8 mm conidogenous, intergraded, terminal

monoblastic, cylindrical, conidia, simple solitary, dry, acrogenous, light olivaceous, cylindrical, straight to curve., smooth walled, 15-38x2-6 mm septate, acute, base truncate, hila unthickened. This is first record of leaf spot disease not only from Jalgaon but Maharashtra.

Leaf spot of *Ougenia dalbergioides* caused by *Phomopsis* sp

The early symptom starts on the young shoot and the plant in July with the start of rainy season. The young shoot buds and leaves are affected and become black. Stem also become black and rotten giving a necked appearance. Interestingly small young plant 3 to 4 feet tall were mostly affected in the September. Plants show die back appear:

Infection spot amphigenous, small, almost, reddish brown, coalescing, pycnidia, almost globose, immersed to erumpent, 30-100 mm in



Fig. 2 : Leaf spot of *Ougeniae dalbergioides* caused by *Phomopsis* sp.

diameter conidiophores, simple, short, hyaline, one, celled, ovoid, 2-3 x 5-2 µm, coiled hyaline, filiform curved or with bent sterigma; spore 3-6 x 0.5 µm.

Leaf and stem rot disease on this host has not been described earlier. Hence this disease is quite typical, new and severe on this host^{5,6,8}.

References

1. BAKSHI, B.K. (1976) Forest Pathology Principles and Practice I Forestry, Controller of Publication Delhi.
2. CHUPP, C. (1953) A Monograph of the fungus genus *Cercospora*, Ithaca, New York.
3. ELLIS, M. B. (1971) Dematiaceous Hyphomycetes, CMI, Kew, England.
4. ELLIS, M. B. (1976) More Dematiaceous Hypomycetes CMI Kew England.
5. FIRDOUSI, S.A. (2014) New species of *Stigmata* from India, *Flora and Fauna*, 20 (1) : 28-30.
6. FIRDOUSI, S.A. AND KHAN T.A. (2015) Two new fungal diseases of trees of Manudeis forest of Jalgaon district. '*Flora and Fauna*', 21 (2) : 158-160.
7. HUNTER, H. L. AND B. B. HUNTER (2010) Illustrated genera of imperfecti Fungi, St Paul press, Minnesota.
8. JAMALUDDIN, RIZVI AND BILGRAMI (2008) Fungi of India host Index and Addenda, Bisen Pal Singh Publication, Dehradun.

CONTENTS

1. Estimation of above ground biomass of the three sites (Grazed site, Protected site and Seed sown site) for comparing their productivity in Kashmir Valley
Afshan Anjum Baba, Syed Naseem ul-Zafar Geelani, Ishrat Saleem, Mohit Husain, Pervez Ahmad Khan, Akhlaq A. Wani and Suheel Ahmad 259-262
2. Ethnoveterinary medicinal uses of some medicinal plants on pneumonia by the Gujjar and Pahari tribes of Poonch district of Jammu and Kashmir
Jamil Ahmed Khan and Rajinder Paul 263-266
3. Effect of Herbal Tea on Weight and Fitness of adult
Archana Singh and Trapti Sen 267-271
4. Elemental Composition, Size Distribution and Image Interpretation of Fine Particulate Matter in Urban City Road sides, Mysore (Karnatka) India
S. Sreenivasa and G.V. Venkataramana 273-282
5. Dye-yielding arboreal species of Sehore District of Madhya Pradesh, India
Archana Shukla and Kirti Jain 283-287
6. Two New severe leaf spot disease on forest trees of Jalgaon (Maharashtra) India
S. A. Firdousi 288-290
7. Ethnomedicinal properties of Bathukamma (Telangana state floral festival) flowers
P. Saritha and U. Anitha Devi 291-300
8. Ethnomedicinal plants used in blood pressure and diabetes by Bhil and Bhilalas tribes of Alirajpur district, Madhya Pradesh, India
Bhupendra H. Bhargav and Rakesh Patel 301-304
9. A survey of infected tomato plants by Root-knot nematodes, *Meloidogyne* Sp. In Fathehabad, Agra (U.P.) India
Sanoj Kumar, Bindhya Chal Yadav and Atul Tiwari 305-308
10. Toxic properties and intake symptoms of some wild plants in relation to reported from the forest of north west Satpuda region of Maharashtra, India
Sanjay A. Khairnar 309-315
11. Cultivation of Makhana, *Euryale ferox* for potential utilization of wetland and its management in North Bihar, India
Arvind Kumar 316-318
12. Phenological behaviour of some selected plant species of Kasubai-Harishchandragarh wild life sanctuary in Ahmednagar (MS) India
Mohan B. Waman 319-330
13. Grassland : An absorber and agricultural field : A source of methane
Kuldeep Kaur 331-340
14. Allelopathic effects of *Parthenium hysterophorus* on seed germination and seedling growth in *Cajanus cajan*
G. S. Thakur 341-349
15. Scooty mould diseases of some trees from Aurangabad district, Maharashtra (India)
Naval Singh and J. Todawat 351-354
16. Effect of phenacylpyridinium salts on bacterial population in light olive-brown soil of Bundelkhand region (U.P.) India
R.K. Gupta, Vandana Gupta, Neel Ratan, Manisha Mishra, Manoj Gupta and K. C. Gupta 355-358
17. Physico-chemical aspects of Yamuna river at Gokul barrage, Mathura (UP) India
Ajay Kumar Rajawat and Praveen Kumar* 359-362