Environment & Ecology 29 (3) : 1099—1100, 2011
 ISSN 0970-0420

Identification of Powdery Mildew Pathogen on *Millettia pinnata* Using Light and Scanning Electron Microscopy in India

PANKAJ BAISWAR*, T. K. BAG, SATISH CHANDRA AND S. V. NGACHAN

ICAR Research Complex for NEH Region, Umiam 793103, Meghalaya, India
E-mail : pbaiswar@yahoo.com
**Correspondance*

Abstract

Powdery mildew was observed on leaves of *Millettia pinnata* in Meghalaya, India. It is used in various industries, for landscaping and is also a potential candidate for production of biodiesel. Light and scanning electron microscopy revealed the presence of the anamorph of *Erysiphe* sp. There is a possibility that this pathogen is an anamorph of *E. diffusa*. This is the first report of powdery mildew on *M. pinnata* caused by *Erysiphe* sp. in India.

Key words : *Millettia pinnata*, Erysiphe sp., *Pongamia pinnata.*

Millettia pinnata is a legume tree which is native to Indian subcontinent and Southeast Asia. Earlier it was referred as *Pongamia pinnata* but now it belongs to genus *Millettia* (1). Other synonyms of *M. pinnata* include *P. glabra*, *Derris indica* and *M. novo-guineensis*. *M. pinnata* is also known as Indian-beech, karanja, poonga-oil-tree, pongam tree and kanji. It has been introduced to Australia, New Zealand, China and USA. Seed oil is used in various industries like soap making and lubricants. Bark, leaf and seed extract are used in preparation of traditional medicines. This is also being considered as a potential plant for biodiesel production. M. pinnata is also used for landscaping purpose, green manuring and as fodder. This tree has great potential as it can be cultivated on marginal lands and can also be used for bioamelioration of degraded lands. Karanjin has also been used for management of insect pest (2). Powdery mildew symptoms were observed on the plants grown in Umsaw Khawan area (Ri Bhoi, Meghalaya, India). Symptoms included circular to irregular white patches on upper sides of the leaves. Voucher specimens have been deposited in the herbarium collection of Agharkar Research Institute, Pune and ICAR Research Complex for NEH Region, India (AMH 9328, ICARHNEH-121). Attempts were made for identification of the powdery mildew pathogen based on anamorphic characters.

(Authors would like to thank the Head, SAIF, Dr Sudeep Dey, Scientific Officer, Dr R. Charkraborty, Mr N. K. Rynjah for scanning electron microscopy at Northeastern Hill University, Shillong, Meghalaya, India).

Methods

Fungal structures, removed using a strip of cello tape were mounted in 3% KOH for microscopic examination (3). Characters examined were type of appressoria on hyphae, conidia in chain or not, position of basal septum and fibrosin bodies. Sputter coating with gold was done using Fine coat ion sputter JFC–1100 (JEOL, Tokyo, Japan). Gold-coated samples were then placed on aluminum stubs in JEOL JSM 6360 (JEOL, Tokyo, Japan) for Scanning Electron Microscopy (SEM).

Results and Discussion

Light microscopy revealed that mycelium was ectophytic, conidia were produced singly, fibrosin bodies absent, lobed appressoria, which indicated *Erysiphe* and excluded the possibility of *Podosphaera, Golovinomyces, Phyllactinia* and *Leveillula* (4). Conidiophores were mostly erect, containing a foot cell (22—32.5 × 5.5—8.5 µm) ; conidia were ovoid (23—31 × 12—15 µm) with length : breadth 1.6—2.8 (av 1.9), median length : breadth 2.1. The basal septum of the conidiophore was just adjacent to mycelium. Broad angular reticulations on the sur-

face of the conidium typical to *Oidium* subgenus *Pseudoidium* and lobed appressoria on hyphae were evident in SEM studies (5). These characters indicated that the pathogen belongs to anamorph genus *Oidium subgenus Pseudoidium* (*Erysiphe* sp.). There is a possibility that this pathogen is an anamorph of *E. diffusa* (earlier *E. glycines*) (6). A perfect stage (chasmothecium) was not found. Pathogenicity tests yielded positive results. Earlier, identification of powdery mildew pathogens, based on anamorphic characters alone was considered to be difficult and in most cases inconclusive because teleomorph (chasmothecium) characters were considered to be essential. But now, identification is possible based on characters of anamorph as revealed by using light and scanning electron microscopy, morphology of the germtube and molecular techniques (4—9). To our knowledge, this is the first record of powdery mildew of *M. pinnata* caused by *Erysiphe* sp. in India (10—13).

References

1. Acharya L., A. K. Mukherjee and P. C. Panda. 2004. Genome relationship among nine species of Millettieae (Leguminosae : Papilionoideae) based on random amplified polymorphic DNA (RAPD). *Zeitschrift fur Naturforschung.* 59C : 868—873.
2. Scott P. T., L. Pregeli, N. Chen, J. S. Halder, M. A. Djordjevic and P. M. Gresshoff. 2008. *Pongamia pinnata* : An untapped resource for the biofuels industry of the future. *Bioenergy Res*. 1 : 2—11.
3. Correll J. C., T. R. Gordon and V. J. Elliott. 1987. Host range, specificity and biometrical measurements of *Leveillula taurica* in California. *Pl. Dis*. 71 : 248—251.
4. Braun U., R. T. A. Cook, A. J. Inman and H. D. Shin. 2002. The taxonomy of powdery mildew fungi. Pp. 13—55 *In* R. R. B' Elanger, W. R.-Bushnell, A. J. Dik, T. L. W. Carver (eds). *The powdery mildews : A comprehensive treatise*. St. Paul. APS Press.
5. Cook R. T. A., A. J. Inman and C. Billings. 1997. Identification and classification of powdery mildew anamorphs using light and canning electron microscopy and host range data. *Mycol. Res.* 101 : 975—1002.
6. Braun U. and S. Takamatsu. 2000. Phylogeny of *Erysiphe, Microsphaera, Uncinula* (Erysipheae) and *Cystotheca, Podosphaera, Sphaerotheca* (Cystotheceae) inferred from rDNA ITS sequences—some taxonomic consequences. *Schlechtendalia* 4 : 1—33.
7. Cook R. T. A. and U. Braun. 2009. Conidial germination patterns in powdery mildews. *Mycol. Res.* 113 : 616—636.
8. Hirata T. and S. Takamatsu. 1996. Nucleotide sequence diversity of rDNA internal transcribed spacers extracted from conidia and cleistothecia of several powdery mildew fungi. *Mycosci*. 37 : 283—288.
9. Shin H. D. and Y. J. La. 1993. Morphology of edge lines of chained immature conidia on conidiophores in powdery mildew fungi and their taxonomic significance. *Mycotaxon* 46 : 445—451.
10. Ahmed N., D. K. Agarwal, O. M. Bambawale and K. C. Puzari. 2007. *Erysiphaceae of India : Monographic treatment*. Venus Printers and Publ., New Delhi, India.
11. Farr D. F. and A. Y. Rossman. 2009. *Fungal databases.* Systematic Bot. and Mycol. Laboratory, USDA. ARS. *http://nt.ars-grin.gov/fungaldatabases.*
12. Hosagoudar V. B. and D. K. Agarwal. 2009. *Powdery Mildews of India- Check List.* Associated Publ. Co., New Delhi, India.
13. Paul Y. S. and V. K. Thakur. 2006. *Indian Erysiphaceae.* Scientific Publ., Jodhpur, India.