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Erysiphe gourae first reported from central India

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ABSTRACT

The fungus *Erysiphegourae*sp. nov., on living leaves of *Medicago lupulana* L. (Fabaceae), Dry deciduous forest of Madhya Pradesh, India, is described, illustrated and discussed. Its identity is confirmed by the key of order *Erysiphales*. Description and nomenclature details were deposited in ARI Pune.

Keywords: Ascomycota, *Erysiphe*, Taxonomy, Teleomorph

INTRODUCTION

The order *Erysiphales* is a fungal group causing important plant disease (powdery mildew) on about ten thousand angiosperm plants including many economically important cultivated and wild plants (Amano 1986, Braun 2011).The biodiversity of the order*Erysiphales* is less explored in tropical and subtropical region as compared to temperate region of the Northern Hemisphere(Hirata 1976).The anamorph or primary symptom is like a white powder,spread on entire plant parts asleaves, young stem, fruits and inflorescence. The anamorphic or white powder is due to conidia and conidiophores they produce. The main difference between *Erysiphe* and *Podosphaera* with regard to their teleomorphs has been considered that *Erysiphe* has multiple asci and *Podosphaera* has a single ascus per chasmothecium (Braun 1987). Characteristic feature of *Erysiphe* described at morphological level, mycelium superficial, hyaline, simple and branched.Conidiophores erect,septate hyaline. Conidia singlecell, hyaline, solitary. Multiple asciand most distinguished character is multiple number of ascospores in each ascus. Current integrated taxonomic generic concepts based on morphology of asexual and sexual morphs and results of phylogenetic analyses were discussed by Braun & Cook (2012).

MATERIALS AND METHODS

Living leaf of *Medicago lupulana* with distinct symptoms were collected during frequent field survey in end of winter, 2014. Perfect stage confirmed by observation and hand lens.Slideswere prepared in lacto-phenoland cotton blue mixture from the scrapping taken from the infected area ofleaf, mounted slides were observedunder Metzer light microscope (100x and 400x). Camera Lucidadrawings was prepared using different power of eye pieces and objective lens combinations. Measurement were made of 15 cleistothecium, 20 asci, 25 ascospore, and more than 25 appendages. The holotype is deposited in the Ajerkar Mycological Herbarium (AMH), Ajerker Pune India(ARI) as type material and isotype also deposited in the Mycological Herbarium of the Department of Botany, Dr. H.S. Gour Central University Sagar (MP)India.

Taxonomy

***Erysiphe gourae*P.** Kushwaha, N.R. Suman and M. K. Ahirwal sp. nov.

TYPE -On living leaves of *Medicago lupulana* L. (Fabaceae)Chhatarpur Forest, M.P., India, March 2014,leg.Prakash Kushwaha, (holotype –AMH- 9673, isotypeS.U. Herb No. Bot. RK 95)

Etymology: Latin, *gourae*refers to the name of renowned person Dr. Harisingh Gour.

Three types of symptoms were observed (1) Anamorphic stage (2) Developing telomorphic stage (3) Telomorphic stage. Anamorphic stage of *Erysiphe* like a white powder spread on both the surface of leaves which are Conidia and conidiophores. Developing telomorphic stage appeared a pale dot like structure, arise short appendages. Teleomorphic stage form mature cleistothecium, which is black in colour, globose or subglobose, Appendages long arise from the outermost layer of the cleistothecium around it.

Symptoms amphegenous irregular to regular, white to light blackish.Colonies amphiphyllous, persistent, forming regular or irregular white patches on the host surface, hyphae hyaline, superficial. Conidiophores erect, hyaline, smooth, thin walled, septate, 84.5x9.5µm diam. Conidia hyaline single cell thin wall solitary aseptate, cylindrical,19-23.5x5.5-8µm diam. Perithecia redish brown in color, 33.5-114 µm diam. containing 4-6 asci. Appendages present, much developed, hyaline, aseptate, thin walled, smooth, unbranched, 8.5-143x4-6µm diam. Asci with short stalk , hyaline, thin walled, smooth, 60.5-85.5x38.5–46µm diam. containing 1-4 ascospore. Ascospores ellispsoid-ovoid, hyliane, smooth, thin walled, aseptate,20.5-26x9-13µm diam.

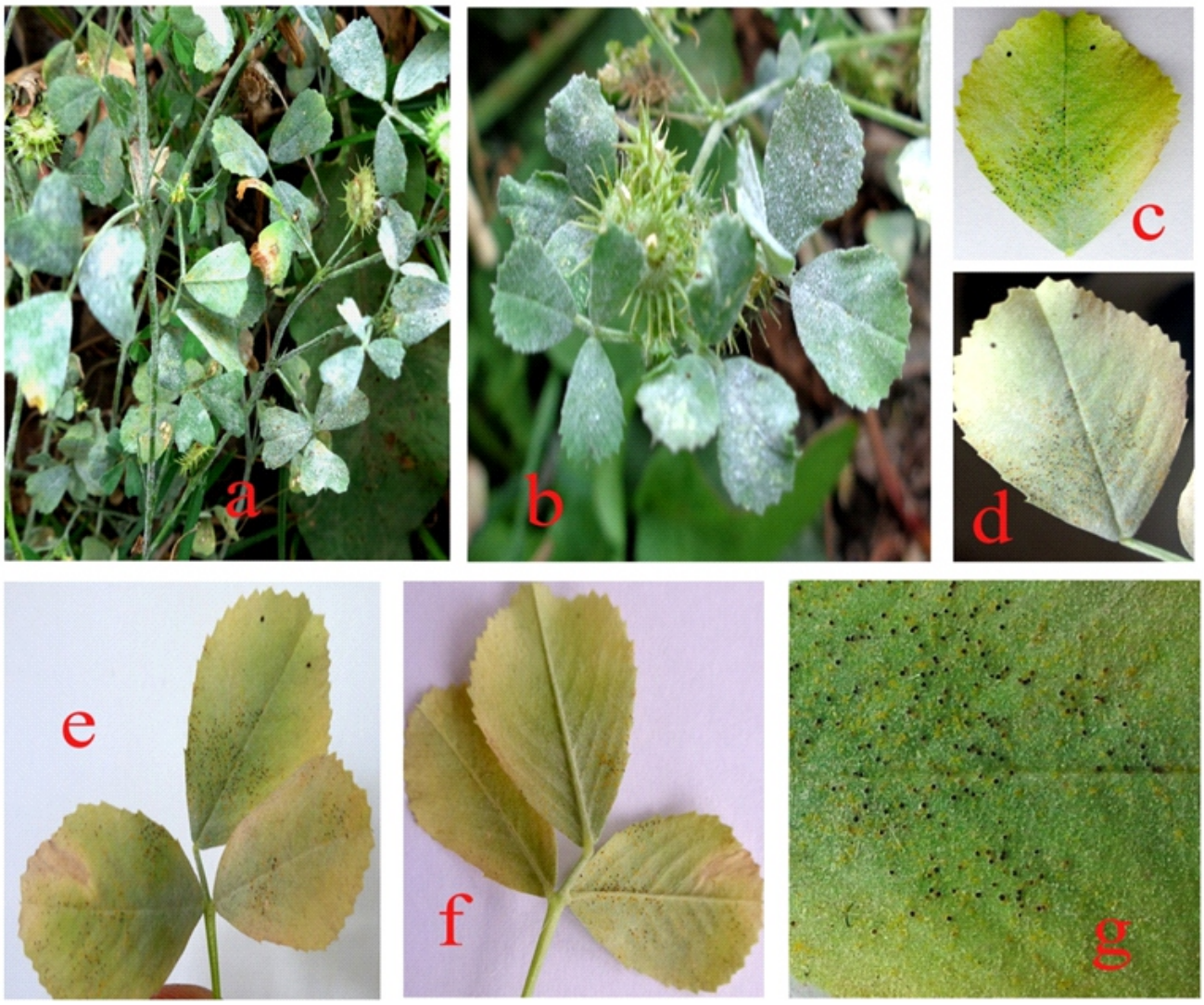


Fig. 1: Symptoms of *Erysiphe gourae*.on *Medicago lupulana*. (AMH- 9673) a. Infected host plant showing anamorph & teleomorph stage; b. Anamorph stage on upper surface of leaf; c-f. Leaf showing teleomorph stage both the surface of leaves; g.Heavily teleomorph stage on upper surface of leaf.

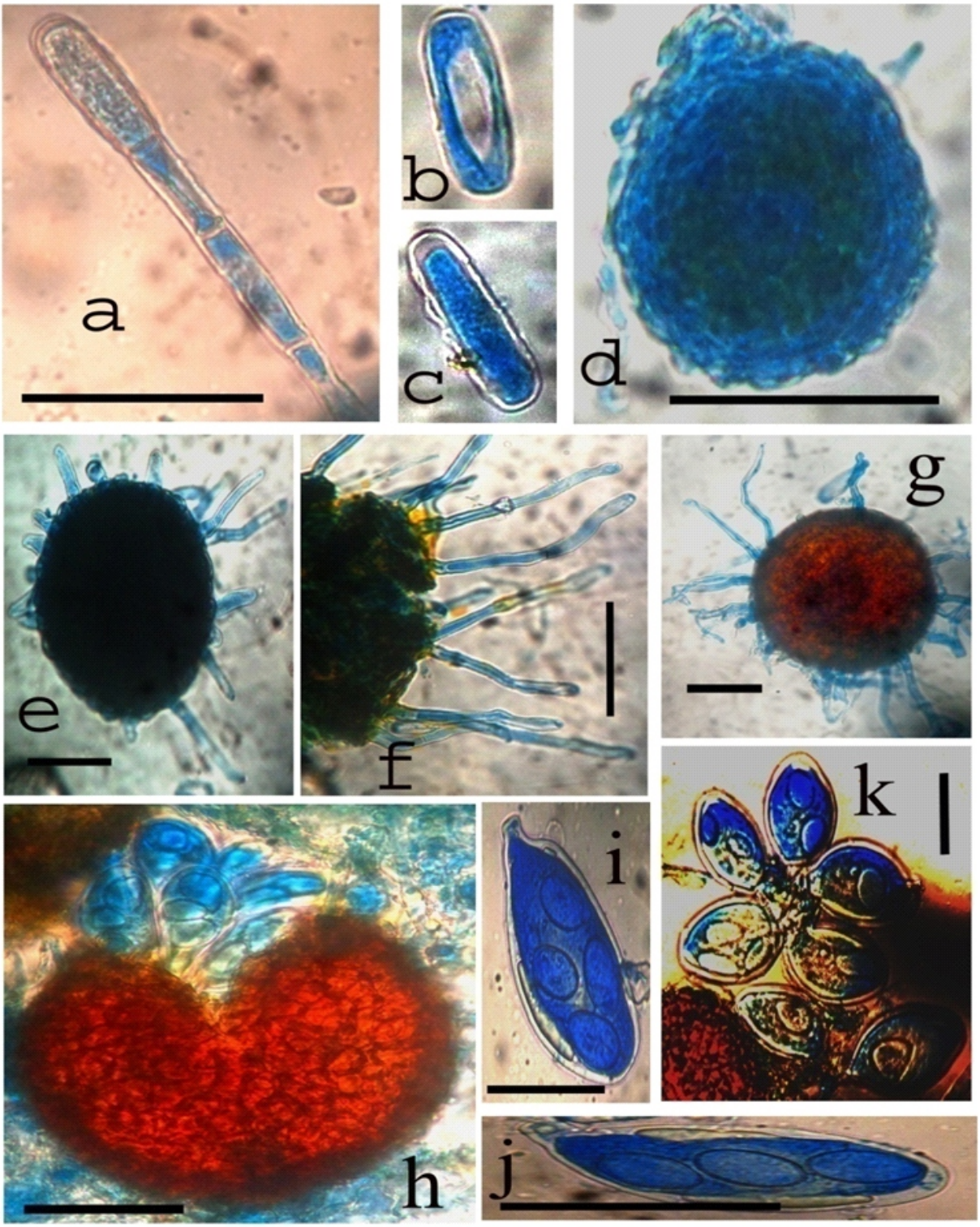


Fig.2 ***Erysiphe gourae*** **(holotype AMH-9673) a. Conidiophores; b-c. Conidia; d-f. Developing teleomorph stage; g. Mature cleistothecium with appendages; h. Asci emerging from cleistothecium; i-h. Asci with ascospores; scale bars:=50µm.**

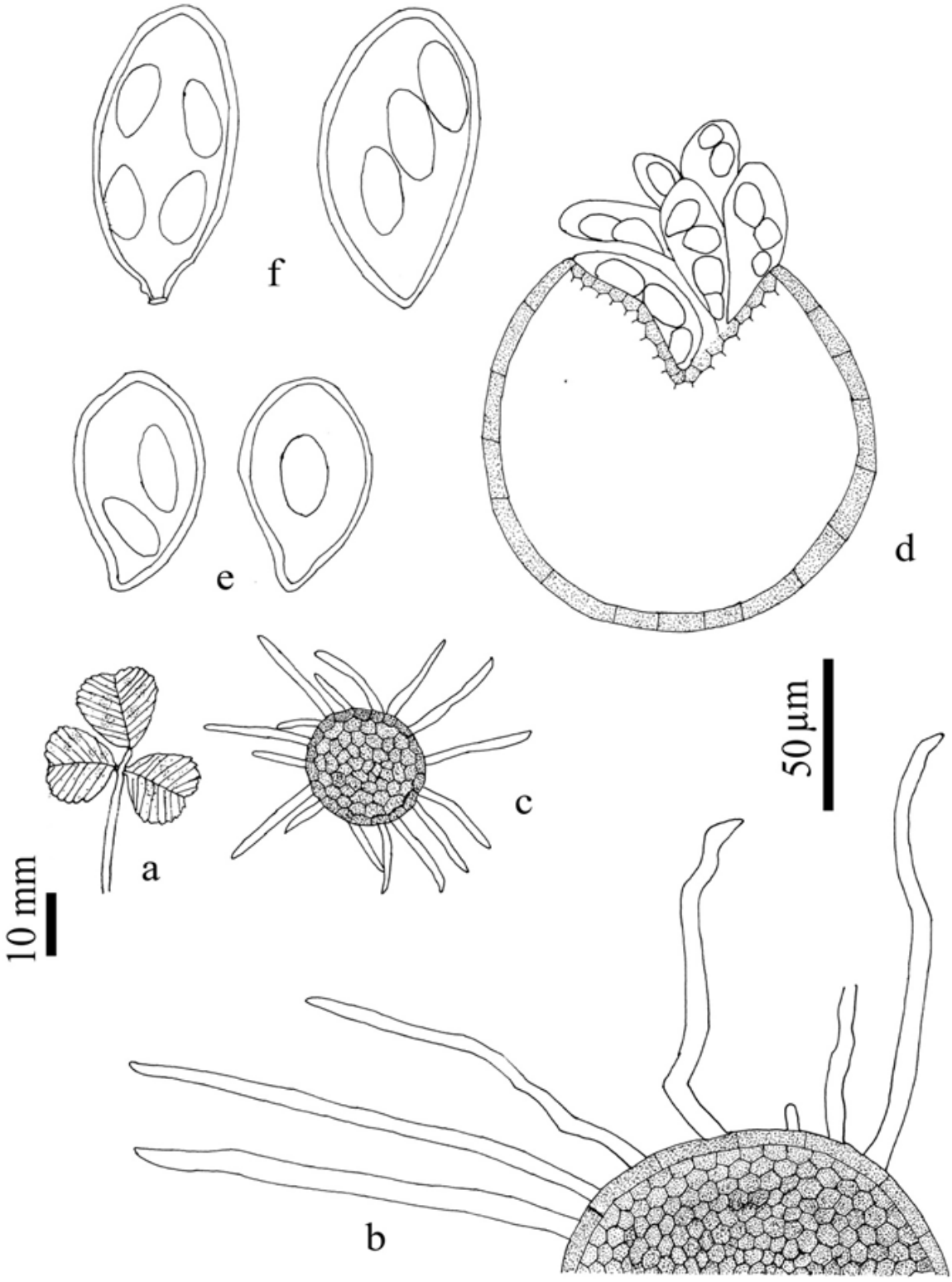


Fig.3- Camera Lucida drawing of *Erysiphe gourae* (holotype, AMH- 9673). a. Symptoms; b- A part of Mature Perithecia; c. Mature Perithecia; d.Emerging asci from Perithecia; e-f Asci with ascospore; Scale bars: a = 10mm; b-e =50 µm.

Table 1: Comparative study of *Erysiphe gourae* sp. nov. with allied sp.

Character	*E. pisi* var. *pisi* Paul (2002)	*E. pisi* var. *kukumi* Paul (2001)	*E. pisi*. var. *medicaginis* Paul (2001)	*E. gourae* sp. nov.
Leaf spots	Amphigenous appears in patches on leaves, later on covering the entire leaf surface forming persistent, thick mat like layer.	Epiphyllous, dense, conspicuous, white, powdery colonies on leaves and stem.	Amphigenous persistent, forming a mat like layer on leaves and stem.	Amphigenous, almost persistent, forming irregular to regular, white patches on the host surface, but later become regular and spreading on both surface of leaves.
Conidiophore	Simple, erect, straight, 29-	Simple, erect, straight , 44-52 × 5-12 µm	Simple, septate, erect, 58-111 × 7-10 µm	macronematous, arising singly, erect, 84.5 × 9.5 µm
Conidia	Borne singly, cylindrical to ellipsoid, 36-59 × 14-18 µm	Borne singly, cylindrical to ellipsoid,19-32 × 10-18 µm	Borne singly, ellipsoid to cylindrical , 34-45 × 14-18 µm	solitary, aseptate, cylindrical, 19-23.5 × 5.5-8 µm
Perithecia	Amphigenous, mainly hypophyllous, scatterd to gregarious, globose to subglobose, 99-124 µm diam.	Amphigenous, scatterd to gregarious, globose to subglobose, 95-179 µm diam.	Amphigenous, uniformaly scattered on leave , petiole and stem, globose to subglobose 76-143 µm diam.	amphiphyllous, globose to subglobose, scattered gregarious to sub gregarious 39-122 × 37.5 127 µm diam.
Appendages	84-278 µm	196-231 × 7-10 µm	64-111 × 3-5 µm	8.5-143x4-6 µm
Asci	3-8, stalked or without stalk, oval to elongated, 66-72 × 41-45 µm, each containing 3-4 ascospores.	4-6, ovoid to subglobose, 49-51 × 29-32 µm, each containing 4-6 ascospores.	3-4, ovoid to obovoid, 49-54 × 29-37 µm, containing 3-5 ascospores.	short stalked, ovoid to subglobose , 4-6, each containing 1-4 ascospores, 71-99 × 42-51 µm.
Ascospore	Ellipsoid to ovoid 18-25 × 12-14µm.	Ellipsoid to ovoid, 17-22 × 9-13 µm.	Ellipsoid to ovoid, 9-20 × 7-10 µm.	Ellipsoid to ovoid, hyaline, aseptate, 24-31 × 11-15 µm.

DISCUSSION

No *Erysiphe* species has been reported onhost*Medicago lupulana*. The details study of literature *E. pisi* var. *kukumi* and *E. pisi* var. *medicaginis*reported on same host family Fabaceae. The *E.pisi*var. *kukumi* and *E. pisi* var. *medicaginis* due to different from size of conidiophores, conidia, perithecia, appendages, number of asci and ascospores which given in Table -1

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