



## Powdery mildew of *Celtis australis*: a report from Himachal Pradesh, India

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Gautam AK 2014 – Powdery mildew of *Celtis australis*: a report from Himachal Pradesh, India. Plant Pathology & Quarantine 4(1), 14–16, Doi 10.5943/ppq/4/1/2

### Abstract

A detailed study of a powdery mildew observed on *Celtis australis* leaves was carried out in the present study. The symptoms appeared as white mycelia on leaves with embedded small black to brown spherical ascomata. Morphological and microscopic analyses of diseased samples revealed that this fungus belongs to *Erysiphe* section *Uncinula*. Further investigation identified it as *Erysiphe kusanoi* which is new to Himachal Pradesh. A description and an illustration of the specimen are given.

**Key words** – circinate appendages – *Erysiphe kusanoi* – mediterranean hackberry – new record

### Introduction

*Celtis australis* L. is a deciduous tree species belonging to family Cannabaceae, distributed widely from southern Europe, North Africa to Asia. The plant leaves and twigs are used as fodder in dry seasons while wood as good quality timber. Extracts from the tree are used to treat edema, headache and boils (Singh 1982, Hocking 1993).

A powdery mildew species was observed on *Celtis australis* plant during a survey of plant diseases in the central region of Himachal Pradesh, India. The disease appeared as white mycelia on leaves with ascomata visible as small black to brown spherical structures upon examination of fresh or dried leaves using a dissecting microscope. The disease was studied further and described in the present study.

### Materials & Methods

#### Sample collection

Powdery mildew samples were collected from naturally infected *Celtis australis* leaves. The location of the collection Mandi, is a well-known region of Himachal Pradesh and popular for its fertile land and plain and hilly regions. The specimen is deposited at Department of Botany, Abhilashi Institute of Life Sciences (AILS), Mandi, Himachal Pradesh, India.

#### Morphological examinations

The infected leaves were examined primarily with a hand-lens and then with a dissecting microscope for the presence of mildew symptoms. A piece of clear adhesive tape was placed on infected leaves, stripped off and then placed on a microscopic slide with one drop of clear distilled

water. The microscopic observations were carried out for morphological characteristics of mycelia on the host, appressoria, size and shape of conidia, conidiophores and chasmothecia.

## Results and Discussion

White mycelium observed on the leaves of *Celtis australis* was analysed in detail. Morphological and microscopic analysis of diseased samples revealed that this fungus belongs to section *Uncinula* of the genus *Erysiphe*. Further investigation identified it as *Erysiphe kusanoi*.

*Erysiphe kusanoi* (Syd.) U. Braun & S. Takam., Schlechtendalia 4: 20, 2000

Fig. 1

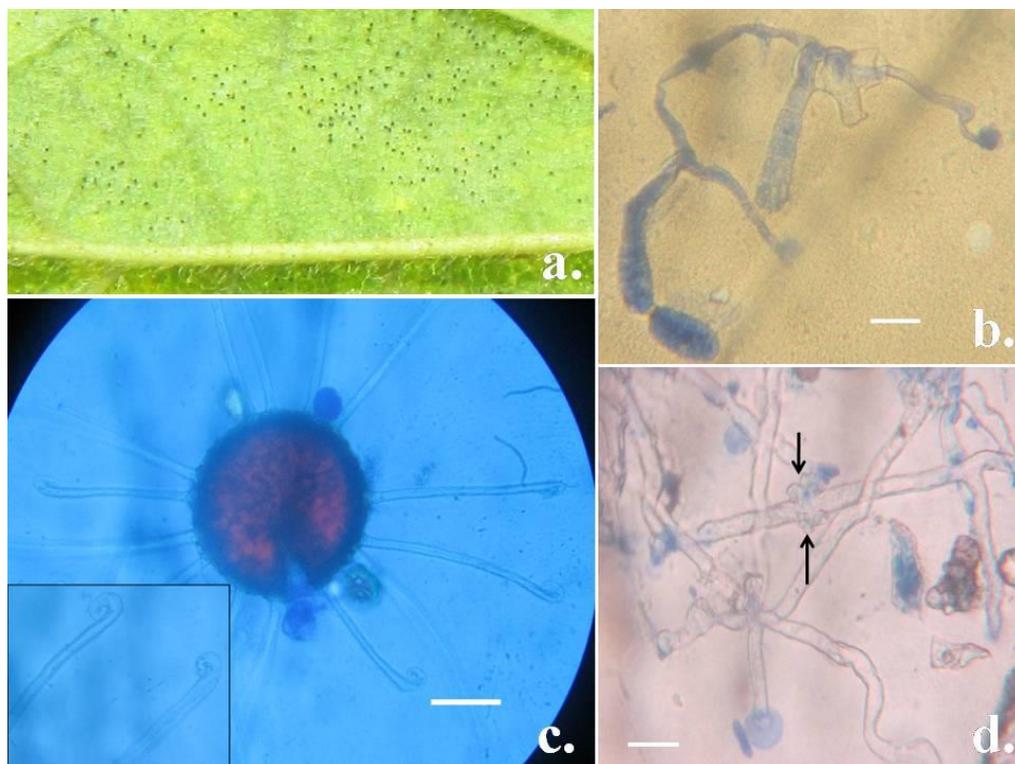
≡ *Uncinula kusanoi* Syd., Mém. Herb. Boissier 4: 4, 1900.

= *U. clintonii* auct. p.p. (*sensu* Salmon 1900 p.p.).

= *U. miyabei* auct. p.p. (*sensu* Tai & Wei 1932, on *Hemiptelea*).

Mycelium amphigenous, effuse, evanescent to almost persistent. Superficial hyphae branched, septate, hyaline, thin walled smooth, flexuous, 3.5–7.5 µm wide. Mycelial appressoria multilobed, coral-shaped, mostly in opposite pairs. Chasmothecia black, scattered, 95–130(–180) µm in diameter when mature, with about 13–22 appendages, equatorial, stiff or mostly somewhat flexuous, about 0.75 times as long as the chasmothecial diameter slightly enlarged at the very base (7.5–10 µm), then equal throughout or increasing somewhat to about 6–8 µm towards the tip, circinate, coiled or hooked at the tip, hyaline, thin walled above, thick towards the base, smooth to rough. Asci 3–7, obovoid-saccate, 40–65 × (25–)30–50 µm, short-stalked, (3–)5–7(–8)-spored; ascospores ellipsoid-ovoid (-subglobose), 25–32.5 × 10–18 µm, colourless.

Conidiophores arising laterally and centrally from the mother cells, erect, up to about 90 µm long, width somewhat increasing from base to top. Foot-cells mostly curved at the base, occasionally slight, subcylindrical, 14–30 × 6–9 µm, followed by 1–2 cells that are shorter than the foot-cells, forming conidia singly. Conidia cylindrical or almost so, 25–40(–45) × 11–18 µm, germinating at terminal position, conidial appressoria multilobate, some two sided.



**Fig. 1** – *Erysiphe kusanoi* on *Celtis australis*. A, Chasmothecia on the lower side of a leaf. B, Conidiophores with conidia. C, Chasmothecia with asci and coiled appendages. D, Appressoria (arrows). Bar = 20 µm (b & d); 50 µm (c).

Known distribution – on different *Celtis* species (*C. australis*, *C. biondii*, *C. koraiensis*, *C. sinensis*, *C. vandervoetiana* and *Hemiptelea davidii*, *Cannabaceae*, in Asia (China, incl. Taiwan, Indian, Japan, Korea).

Material examined – India, Himachal Pradesh, Mandi, 760 metres (2,495 ft), on leaves of *Celtis australis* L., 14 November 2013, Ajay Kumar Gautam (AILS 1001).

Note – Based on morphology and microscopic dimensions of conidia, conidiophores, chasmothecia as well as asci and ascospores, it was concluded that powdery mildew on *Celtis australis* in Himachal Pradesh belongs to *Erysiphe kusanoi* (Braun & Cook 2012). This species is known from Uttar Pradesh, India (Ahmad et al. 2007, Hosagoudar & Agarwal 2009, Braun & Cook 2012), but it is new for Himachal Pradesh. Two other collections of powdery mildew on *Celtis australis*, pertaining to “*Uncinula clintonii* Peck” recorded from Almora, Uttar Pradesh, now Uttarakhand (Pandey & Gupta 1983) and *Pleochaeta indica* (Ahmad et al. 1995), were made earlier in India. “*U. clintonii*” (*sensu* Salmon 1900) on *Celtis australis* refers to *E. kusanoi* (Braun & Cook 2012).

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