

NEW RECORD OF *Podosphaera xanthii* ON *Ageratum conyzoides* L. IN PAKISTAN

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ABSTRACT

Powdery mildew fungi are one of the important pathogens and cause a significant damage in various plants. Ageratum conyzoides L. is a widespread perennial weed having important medicinal and biocontrol properties. In April 2012, a severe outbreak of powdery mildew was observed on A. conyzoides. Powdery mildew symptoms were mainly observed on stem and both sides of young and mature leaves, but not on floral parts. On the basis of morphological characters, the fungus was identified as a Podosphaera xanthii. Pathogenicity test was conducted in green house at 22°C and 80% RH and seven days after inoculation, white powdery mildew colonies appeared on the leaf surface. Fungal colony was reexamined for the confirmation of pathogen. This is the first report of P. xanthii on A. conyzoides in Lahore, Pakistan.

Key words: *Podosphaera xanthii*, *Ageratum conyzoides*, powdery mildew

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INTRODUCTION

Powdery mildew fungi are widespread parasitic Ascomycetes causing infection in more than 10,000 plant species, including many economically important crops and ornamental plants world wide (Takamatsu, 2004). All powdery mildew fungi are obligate pathogens and therefore require living host cells for growth (Micali *et al.*, 2008). Various studies have been reported on occurrence of powdery mildews on economically important crops and ornamental plants in Pakistan (Mukhtar *et al.*, 2013, 2012; Burni *et al.*, 2010).

Ageratum conyzoides L. (goat weed) belonging to family Asteraceae, is a native to South and Central America and extends as a common weed from north to south of the equator (Johnson, 1971). In various parts of Africa, Asia and South America, this weed has been

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used for treatment of various diseases. It is a widespread uncultivated perennial weed and an important medicinal plant, growing along irrigation canals in Pakistan (Ahmad *et al.*, 2006; Asad *et al.*, 2011). Crude or refined extracts from *A. conyzoides* offer the possibility of biocontrol of plant pathogenic fungi (Iqbal *et al.*, 2004). However, in April 2012, a severe outbreak of powdery mildew was observed on *A. conyzoides* in Lahore, Pakistan. Therefore present investigation was undertaken to study the causal agent of powdery mildew on *A. conyzoides*.

MATERIALS AND METHODS

For the visualization of fungal structures, a small portion of powdery mass was harvested by dislodging it from infected leaf surface onto a strip of clear tape and was mounted on glass slide having a drop of water/ lactophenol/ cotton blue and observed under microscope (Correll *et al.*, 1987). Morphological characteristics of the pathogen such as mycelia, shape of appressoria, size and shape of conidia and conidiophores were recorded for identification with the help of literature (Braun *et al.*, 2001).

Pathogenicity of fungal species was confirmed by dusting conidia with the help of sterilized fine paint brush from four heavily infected leaves on healthy leaves of six healthy plants (6week old) of *A. conyzoides* and covered with plastic bags. For control, leaves of healthy plants were not inoculated with fungal spores. Plants were maintained in a greenhouse at 22°C and 80% RH. Plants were examined after 7- 10 days of inoculation for assessment of disease incidence.

RESULTS AND DISCUSSION

Powdery mildew symptoms were mainly observed on stem and both sides of young and mature leaves, but not on floral parts. Initially, white powdery colonies were present on the abaxial surface, but as the disease progressed, fungal colonies developed on the adaxial surface, the spots coalesced, and the entire leaf turned yellow and necrotic in later stages (Fig 1A-C).

Microscopic examination revealed the presence of powdery mildew conidia and conidiophores. Hyphae were up to 4-6µm wide with appressoria indistinct to slightly nipple-shaped (Fig1 D). Conidiophores were straight and unbranched, foot-cells cylindrical, 40-80 × 8-12 µm, followed by 1-3 shorter cells. Basal septa of conidiophores were adjacent to mycelium (Fig 1E). Conidia were in chains, hyaline, ellipsoid to ovoid or doliform, 20-35 × 14-20µm with conspicuous refractive fibrosin bodies (Fig 1 F). Conidial length-to-width ratios ranged from 1.3 to 1.9. Fibrosin bodies were present in

conidiophores and conidia. Observation of conidia and conidiophores in 3% KOH indicated the presence of rod shaped fibrosin bodies (2-5 μ m) commonly found in powdery mildew genus *Podosphaera*. Germ tubes developed laterally with simple appressoria. Chasmothecia (formerly cleistothecia) was not observed on infected leaves samples. On the basis of morphological characteristics of the imperfect state, this powdery mildew was identified as *Podosphaera xanthii* [(Castagne) U. Braun & N. Shishkoff (synonyms: *P. fusca*, *Sphaerotheca fulginea* and *S. fusca*] (Braun *et al.*, 2001). A voucher specimen (FCBP00049) has been deposited in the First Fungal Culture Bank of Pakistan (FCBP), Institute of Agricultural Sciences, University of the Punjab, Lahore, Pakistan.

In green house, seven days after inoculation, white powdery mildew colonies appeared on the leaf surface (Fig 1F). No symptoms developed on the controls. From India powdery mildew on *A. conyzoides* caused by *Podosphaera* sp. has been reported without any description (Baiswar *et al.*, 2008). In present study, the presence of fibrosin bodies and indistinct appressoria ruled out the possibility of *Golovinomyces cichoracearum* and *Erysiphe* spp. To our knowledge, this is the first record of powdery mildew of *A. conyzoides* caused by a *P. xanthii* in Pakistan.

CONCLUSION

Powdery mildew caused by *P. xanthii* has been reported as one of the most widespread and damaging diseases in various plants world wide. In Pakistan, this fungal species mostly has been reported on cucurbit crops (Block and Reitsma, 2005; Kousik *et al.*, 2008). However, according to literature and our knowledge, this is the first record of powdery mildew of *A. conyzoides* caused by a *P. xanthii* in Pakistan.



Figure 1 (A-F). Powdery mildew on *Ageratum conyzoides* (A) fungal infection on plant, (B) mildew on upper side of leaf, (C) fungal mass on stem (E) conidiphore with basal septa (F) conidia with fibrosin bodies.

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