Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Powdery Mildew Caused by *Phyllactinia pyri-serotinae* on Pear (*Pyrus communis*) from India

Sana Surma,¹ Z. A. Bhat,^{1†} M. A. Bhat,¹ M. D. Shah,¹ Khalid Z. Masoodi,² Z. A. Dar,³ Injila Qadri,¹ Bilal A. Padder,¹ Aflaq Hamid,¹ Najeeb M. Mughal,¹ M. A. Ahanger,⁴ and Suhail Manzoor¹

¹ Division of Plant Pathology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, 190025, India

² Transcriptomics Laboratory, Division of Plant Biotechnology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, 190025, India

³ Dry Land Agriculture Research Station, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Rangreth, 190001, India

⁴ Mountain Crop Research Station, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Sagam, Anantnag, India

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In August 2020 powdery mildew was observed on pear cv. Fertility at the university research field in Shalimar, Srinagar, Jammu and Kashmir, India (34° 08' 30.5" N and 74° 51' 42.0" E), with a disease incidence up to 30% (100 leaves observed from 10 trees). White, irregularly shaped fungal colonies were observed on the abaxial leaf surface and later covered the whole leaf surface and developed black chasmothecia. The affected leaves appeared brittle, slightly curved upwards, and dropped prematurely. Mycelium was hypophyllous, septate, and measured 2.0 to 5.0 µm wide. Appressoria were nipple-shaped and solitary or present in opposite pairs. Conidiophores were erect, up to 440.0 µm long ($n = 50$), and mostly centrally on upper surface of mother cells. Conidiophore foot cells were filiform, followed by one to three shorter cells, producing single conidia at the tip. Conidia were hyaline, lanceolate, with a nonpapillate rounded apex, measuring 55.5 to 81.4 × 14.8 to 22.5 µm ($n = 50$) and devoid of any conspicuous fibrosin bodies. Germ tubes were filiform, twisted, arose basally, and measured 2.0 to 5.0 µm wide. Chasmothecia were hypophyllous, black, scattered, globose, and measured 195.0 to 255.0 µm in diameter ($n = 50$) with 8 to 12 equatorial, acicular, up to 270.0 µm long appendages with a 25.9 to 44.4 µm diameter bulbous base ($n = 50$) and obtuse or subacute apex. Asci in a

chasmothecium were clavate to saccate, 62.9 to 81.4 × 18.5 to 22.2 µm ($n = 50$), stalked, and two spored. Ascospores were 33.3 to 40.7 × 12.9 to 18.5 µm ($n = 50$) and pale yellowish or golden brown. All morphological features were consistent with *Phyllactinia pyri-serotinae* (Braun and Cook 2012). To confirm the fungus identity at the molecular level, DNA of two isolates was extracted from chasmothecia. The internal transcribed spacer (ITS) sequence of ribosomal DNA was amplified with the primers ITS1 and ITS4 (White et al. 1990) and sequenced. The ITS sequences submitted to NCBI GenBank under accession numbers MZ505441 and MZ505442 had 97 (416/427) and 96% (424/440) and 99 (424/430) and 98% (428/438) base pair matching with *P. pyri-serotinae* isolates from Japan (AB080521 and AB985507, respectively). Thus, the pathogen was identified as *Phyllactinia pyri-serotinae* Sawada based on morphological and molecular sequence analyses. Pathogenicity tests of both the isolates were carried out on 1-year-old pear saplings (cv. Fertility) and repeated twice. The inoculum was prepared by collecting *P. pyri-serotinae* conidia in sterile distilled water from infected pear leaves. Three saplings were inoculated by spraying (15 ml per sapling) the inoculum (3×10^5 spores ml⁻¹) on leaf surfaces, while three saplings sprayed with sterile distilled water served as noninoculated controls. After 15 days of incubation at 25°C in a greenhouse, similar symptoms as observed on naturally infected plants were observed on inoculated plants and uninoculated plants remained symptomless. The pathogen of interest observed on inoculated plants was morphologically characterized and found to be similar to *P. pyri-serotinae*. A voucher specimen was deposited in the Herbarium *Cryptogamae Indiae Orientalis* (HCIO), Indian Agricultural Research Institute, New Delhi, under accession number 52213. Pear is the third most important temperate fruit grown in India (Chattopadhyay 2009), and our study revealed *P. pyri-serotinae* as a new causal agent of powdery mildew in addition to *P. guttata* (Dhar and Shah 1982) under Indian conditions.

References:

- Braun, U., and Cook, R. T. A. 2012. Taxonomic Manual of the Erysiphales (Powdery Mildews). CBS Biodiversity Series No. 11. CBS, Utrecht, the Netherlands.
- Chattopadhyay, T. K. 2009. Page 46 in: A Textbook of Pomology. Kalyani Publishers, New Delhi.
- Dhar, A., and Shah, A. M. 1982. Indian Phytopathol. 35:528.
- White, T. J., et al. 1990. Page 315 in: PCR Protocols: A Guide to Methods and Applications. Academic Press, San Diego, CA.

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[†]Indicates the corresponding author.

Z. A. Bhat; zahoor.bhat2012@gmail.com