Two new Phragmidium species identified on Rosa plants native to China

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Abstract

Two new Phragmidium species, Phragmidium zhouquensis and Ph. longissima, were identified on two native plants, Rosa omeiensis and R. lichiangensis respectively, during an investigation of the occurrence of rust fungi in western China. Phragmidium zhouquensis is mainly characterized by 3–9-celled teliospores bearing minute verrucae on the surface. Phragmidium longissima differs from other Phragmidium species in that it possesses echinulate urediniospores with a pore membrane at the germ pore. Phylogenetic analyses based on 28S rRNA partial gene sequences revealed that specimens of Ph. zhouquensis and Ph. longissima formed two distinct lineages. Phragmidium longissima is the first Phragmidium species to be identified on R. lichiangensis.

Key words: molecular phylogeny, Pucciniales, rose rusts, taxonomy

Introduction

The genus Rosa L. (Rosaceae) is of worldwide economic importance as the centre of a large ornamental shrub and cut flower industry. Rosa species are widely distributed throughout the temperate and subtropical habitats of the northern hemisphere (Matthews 1995). Rosa omeiensis Rolfe and R. lichiangensis T. T. Yu & T. C. Ku are two species native to central and western China (Lu et al. 2003).

The genus Phragmidium Link is a common rust fungus restricted to plants belonging to the family Rosaceae, especially the genera Potentilla, Rosa and Rubus. Phragmidium is characterized by Caeoma-type aecia with catenulate aeciospores, Uredo-type or Calodion-type uredinia with peripheral paraphyses and dark brown teliospores that are typically festooned with several transverse septa along with 2–3 germ pores per teliospore cell (Cummins & Hiratsuka 2003, Yun et al. 2011). Most species within this genus produce subcuticular spermogonium, caeomatoid aecium, uredinium and telium during the autoecious macrocyclic life cycle (Cummins & Hiratsuka 2003, Zhuang et al. 2012).

Approximately 60 to 65 species have been recognised as Phragmidium, and 30 of these have been reported to infect wild Rosa species and ornamental Rosa cultivars (Cummins & Hiratsuka 2003). Wahyuno et al. (2001) described seven Phragmidium species by analysing the morphological characteristics of a maximum of four spore stages from ten previously recorded species. These authors determined that the length, width, degree of tapering toward both ends, and apiculus length were sufficient to determine gross teliospore morphology, and these have been considered as important taxonomic characters. The cell number, wall colour, surface rugosity, and hygroscopicity of the lower part of the pedicel also have been used as taxonomic features at the telial stage. A total of 11 Phragmidium species have been reported on Rosa in China, including Ph. butleri H. Sydow & P. Sydow, Ph. fusiforme J. Schröter, Ph. handelii Petrak, Ph. hashiokai Hiratsuka f., Ph. kamtchatkae (F. W. Anderson) Arthur & Cummins, Ph. montivagum Arthur, Ph. rosae-multiflorae Dietel., Ph. mucronatum (Persoon) Schlechtendal, Ph. robustum J. Y. Zhuang & S. X. Wei, Ph. rosae-omeiensis S. X. Wei, and Ph. tuberculatum Jul. Müller. The latter four species have been described on Rosa omeiensis (Tai 1979, Wei 1988, Hiratsuka et al. 1992, Cao & Li 1996, 1999, Zhuang & Wei 2003, Zhuang 2005, Zhuang & Wang 2006, Zhuang et al. 2012, Xu 2013).

During an investigation of rust fungi in western China, two previously unknown Phragmidium species were