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# Species, host range, and geographical distribution of powdery mildew fungi in Iran

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**Abstract** — A comprehensive review of the species, host range and geographical distribution of powdery mildew fungi in Iran is presented. The listed fungi belong to eight teleomorphic genera — *Blumeria* (1 species), *Erysiphe* sect. *Erysiphe* (14 species), *Erysiphe* sect. *Microsphaera* (15 species), *Erysiphe* sect. *Uncinula* (6 species), *Golovinomyces* (9 species), *Leveillula* (14 species), *Neoerysiphe* (2 species), *Phyllactinia* (3 species), *Podosphaera* sect. *Podosphaera* (3 species), *Podosphaera* sect. *Sphaerotheca* (12 species), and *Sawadaea* (2 species) — and one anamorphic genus, *Oidium* (five species). The 528 host plant species reported in the checklist pertain to 287 genera. The complete checklist of fungi is available on http://staff.guilan.ac.ir/staff/users/khodaparastm/fckeditor_repo/file/Checklist.pdf.

**Key words** — biotrophic fungi, biodiversity, *Erysiphaceae*

## Introduction

Fungi belonging to the order *Erysiphales* are widely distributed all over the world and cause powdery mildew diseases on numerous wild as well as cultivated plants. The knowledge of powdery mildew species in particular areas is important for understanding the biology and taxonomy of these fungi as well as for phytopathological purposes. During the past ~150 years, many fungi have been collected in and around Iran, including representatives of the *Erysiphales*. However, powdery mildews have never been extensively studied in Iran, so that information on the species and their host plants is scattered in various plant pathological reports and some general fungal lists (Esfandiari 1946a,b, 1947, 1948, 1951; Eskandari 1964; Petrak 1941, 1949, 1953; Petrak & Esfandiari 1941; Sharif & Ershad 1966; Altman et al. 1972; Ershad 1971, 1995). To our knowledge, Rabenhorst (1871), citing two species of powdery mildew from Iran, was the first to report *Erysiphales* from the country. Some recent

publications include lists of the powdery mildew fungi from Iran, but these have been incomplete and restricted to regional studies (Khodaparast et al. 2000b, 2001; Tajik-Ghanbary et al. 2005; Tavanaei et al. 2005; Pirnia et al. 2007). The aim of this paper is to provide a comprehensive review of the species, host range, and geographical distribution of powdery mildew fungi in Iran.

## Materials and methods

Between 2002 and 2007 numerous new collections and herbarium specimens of *Erysiphales* from Iran were examined using light microscopy. In addition, a list of the species, including their host plant species and geographical distributions, were compiled using data from the literatures. The generic taxonomy was based on the new genus concepts introduced by Braun (1999), Braun & Takamatsu (2000), and Braun et al. (2002). Species identification followed Braun (1987, 1995) and recent papers (Khodaparast et al. 2000a, 2002; Shin 2000; Braun et al. 2001, 2006; Takamatsu et al. 2007; Braun & Minnis 2008). Host plant nomenclature follows The International Plant Names Index and Flora Europaea (Anonymous 2008a,b).

## Results

Table1. Overview of the taxa of the *Erysiphales* and their host plant genera and species reported from Iran

| Genus | Number of fungal species | Number of host plant genera | Number of host plant species |
|---|---|---|---|
| *Blumeria* | 1 | 21 | 53 |
| *Erysiphe* sect. *Erysiphe* | 14 | 60 | 92 |
| *Erysiphe* sect. *Uncinula* | 6 | 8 | 15 |
| *Erysiphe* sect. *Microsphaera* | 15 | 13 | 23 |
| *Golovinomyces* | 9 | 43 | 61 |
| *Leveillula* | 14 | 116 | 187 |
| *Neoerysiphe* | 2 | 8 | 10 |
| *Phyllactinia* | 7 | 23 | 42 |
| *Podosphaera* sect.*Sphaerotheca* | 12 | 28 | 44 |
| *Podosphaera* sect. *Podosphaera* | 3 | 5 | 10 |
| *Sawadaea* | 2 | 1 | 8 |
| ***Oidium*** | 5 | 85 | 96 |

A total of eight teleomorphic genera and 90 species of the *Erysiphales* were identified in Iran. According to our results these fungi parasitized approximately 528 host plant species in this country. The names of the powdery mildew genera, the number of species per genus, the number of host plant genera and

species are summarized in Table 1. The complete alphabetical checklist, which lists all powdery mildew taxa, host plant species, collection sites, and relevant references, can be downloaded from http://staff.guilan.ac.ir/staff/users/khodaparastm/fckeditor_repo/file/Checklist.pdf. The cited 528 host plant species represent 287 genera. It is expected that more collections and further taxonomic studies will substantially increase our knowledge on the presence of these fungi in Iran.

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