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43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

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Cover: Stripe-necked Mongoose *Urva vitticollis* in poster colours, adapted from photograph by Ashni Dhawale, by Pooja Ramdas Patil.



Diversity of powdery mildew fungi from protected areas of Jizzak region, Uzbekistan - a checklist

I.M. Mustafaev¹ , I.Z. Ortiqov² , K.K. Nuraliev³ & D.S. Khujaqulova⁴

^{1,2,4} Institute of Botany of Academy of Sciences of the Republic of Uzbekistan, Tashkent 100053, Uzbekistan.

³ Tashkent State Agrarian University, Tashkent 100140, Uzbekistan.

¹elyor-mustafaev@inbox.ru (corresponding author), ²ortiqovi@inbox.ru, ³h.nuraliev@mail.ru, ⁴durdonaxojaqulova@gmail.com

Abstract: The first-ever compilation of a checklist for powdery mildew fungi within the protected areas of Uzbekistan's Jizzakh region, specifically Nuratau Nature Reserve, Zaamin National Nature Park, and Zaamin Nature Reserve is presented through this study. Field research spanning from 2009 to 2022 facilitated this comprehensive endeavor. A comprehensive identification process revealed a total of nine groups, consisting of 57 distinct types, 69 variations, and four different strains of powdery mildew. Two species, namely *Erysiphe platani* and *E. syringae*, were newly identified within the mycobiota of the country. Additionally, the plant index of Uzbekistan documented 11 powdery mildew species and ten variations on 18 previously unrecorded host plant species. Most species of powdery mildew fungi belong to the genera *Erysiphe* and *Leveillula*. The annotated checklist includes data on the host plant, location, date and collection number of every species.

Keywords: Disease, Erysiphaceae, host plants, Nuratau Nature Reserve, Zaamin Nature Reserve, Zaamin National Nature Park.

Uzbek: Ushbu maqolada O'zbekistonning Jizzax viloyatida joylashgan Nurota qo'riqxonasi, Zomin milliy bog'i va Zomin davlat qo'riqxonasi hududlarida tarqalgan un-shudring zamburug'larining dastlabki ro'yxati keltirilgan. Natijalar 2009 yildan 2022 yilgacha bo'lgan tadqiqot natijalari asosida shakllantirilgan. Dala tadqiqotlari davomida olib kelingan mikologik gerbariy namunalari identifikatsiya qilish jarayonida un-shudring zamburug'larining 57 tur, 69 forma va 4 variatsiyasi qayd etildi. Shundan, *Erysiphe platani* va *E. syringae* O'zbekiston mikobiotasi uchun yangi ekanligi aniqlangan. Bundan tashqari, 11 tur un-shudring zamburug'lari xo'jayin o'simliklarning 18 turida ilk bor qayd etilgan. Tadqiqot hududlarida un-shudring zamburug'lari orasida *Erysiphe* va *Leveillula* turkumi vakillari yetakchilik qiladi. Ushbu maqolada xar bir zamburug' turning xo'jayin o'simligi, qayd etilgan yillari keltirilgan.

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Author details: ILYOR MURADDULLAYEVICH MUSTAFAYEV, Institute of Botany of Academy of Sciences of the Republic of Uzbekistan. Head of the laboratory of Mycology and Algology. Specialization—fungal diversity, fungal taxonomy, fungal ecology, plant disease management. ISLOM ZIYODULLA UGLI ORTIQOV, PhD student, Institute of Botany of Academy of Sciences of the Republic of Uzbekistan. Specialization—mycology, fungal diversity, plant disease management. KHAMRA KHAYDARALIYEVICH NURALIEV, Tashkent State Agrarian University. Professor of the Department of Plant Protection. Specialization—mycology, plant disease management. DURDONA SADRIDDIN QIZI KHUJAQULOVA, PhD student, Institute of Botany of Academy of Sciences of the Republic of Uzbekistan. Specialization—mycology.

Author contributions: I.M.M. - reviewing and editing; I.Z.O. - writing, reviewing and editing; K.K.N. - data collection; D.S.K. - reviewing and data collection. All authors have read and agreed to the published version of the manuscript.

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INTRODUCTION

Powdery mildews belong to the *Erysiphaceae*. The main geographical regions of the distribution are in the temperate zone of the northern hemisphere. They are obligate biotrophs responsible for diseases in many plants. They are cosmopolitan, widespread on various hosts including vegetables, trees, herbs, shrubs, grasses, ornamental plants and weeds (Braun 1987). In many cases, powdery mildew fungi are more common in cultivated plant hosts (Pawar & Patil 2011). The fungi infect almost every group of plants, i.e., from grasses to higher angiosperms (Braun & Cook 2012). Powdery mildews are easily visible on infected plant leaves, stems, and fruits. The first symptoms appear as white powdery spots on leaves, branches and sometimes on fruits. Over time, disease severity increases under favorable conditions. Disease symptoms usually appear with the onset of summer and begin to disappear during the scorching heat and rainy season (Pap et al. 2013).

A considerable number of powdery mildew samples were collected and examined during exploring of the fungal diversity of Uzbekistan; contributions have been published in 1926–2023 (Zaprometov 1926; 1928; Golovin 1949; Rotkevich 1960; Gaponenko 1965; Gaponenko et al. 1983; Solieva 1989; Kamilov 1991; Nuraliev 1998; Gafforov 2004; Mustafaev 2018; Mustafaev et al. 2019; Abdurazakov et al. 2021).

Recently, invasive species of powdery mildew, originating from other regions of the world, have spread extensively in Uzbekistan (e.g., *Erysiphe australiana* on *Lagerstroemia indica*); they are mostly found on introduced trees and shrubs that are widely used for landscaping (Nabieva et al. 2021).

The current study aims to compile a checklist of powdery mildew of vascular plants of the Nuratau Nature Reserve, Zaamin Nature Reserve, and Zaamin National Nature Park in the Jizzakh region. The present checklist serves as one of the sources to make the complete modern list of powdery mildew of the Republic of Uzbekistan.

Study Area

The present compilation brings together as much information, related to powdery mildew reported from protected areas of Jizzakh region (Nuratau Nature Reserve 40°30'34.8" 66°44'18.4", Zaamin Nature Reserve 39°34'41.4" 68°24'21.5", Zaamin National Nature Park 39°39'56.4" 68°24'18.3") (Fig. 1), as possible.

METHODS

About 1,000 powdery mildew fungi were collected in 2009–2022 years in different habitats of protected natural areas. Samples were collected from the affected parts of the plants and either used fresh or stored dry as herbarium material until analysis, as described by Heluta (1989). These are designated in the checklist by the following abbreviations: NNR – Nuratau Nature Reserve, ZNR – Zaamin Nature Reserve, ZNNP – Zaamin National Nature Park. Specimens: Chasmothecia, conidiophores, and conidia were observed and measured in oil immersion, using a Moticam 5N-300M microscope at a magnification up to ×400 and identified using the relevant literature (Zaprometov 1926; 1928; Golovin 1941; Gaponenko 1965; Panfilova & Gaponenko 1983; Gaponenko et al. 1983; Heluta et al. 2004; Braun 2012; Raximova et al. 2014). (1968–1993) and 'Flora of Uzbekistan' (1941–1962). All collected specimens are stored in the Fungarium of the Institute of Botany in Tashkent. Voucher specimens for each species of powdery mildew fungi are cited in the checklist below. The name of the collector is designated by abbreviation: IM – Ilyor Mustafaev, IOZ – Islom Ortiqov, XD – Xo'jaqulova Durdona. The taxonomy and nomenclature of powdery mildew fungi in the checklist follow international databases Index Fungorum (2023) and Mycobank (2023). The nomenclature of host plants is given according to powo.science.kew.org/results (2023). All collected specimens are stored in the Tashkent Mycological Herbarium (TASM) of the Institute of Botany.

RESULTS

In the protected areas of the Jizzakh region, including NNR, ZNR, and ZNNP, an extensive survey uncovered a diverse range of powdery mildew fungi. These findings encompass nine genera and 57 species, with 69 forms and four varieties, all identified through morphological characteristics. These fungi were documented on 137 host plant species, further grouped into 107 genera and 34 families (Table 1). *Erysiphe* emerged as the most species-rich genus, boasting 19 species, 26 forms, and four variations, closely followed by *Leveillula* with 16 species and 27 forms. *Podosphaera* accounted for nine species and three forms, while *Phyllactinia* exhibited four species and four forms. Additionally, *Golovinomyces* and *Sphaerotheca* each comprised four and three species, respectively, while *Uncinula*, *Neoerysiphe*, and *Blumeria* were each confined to one host plant species.

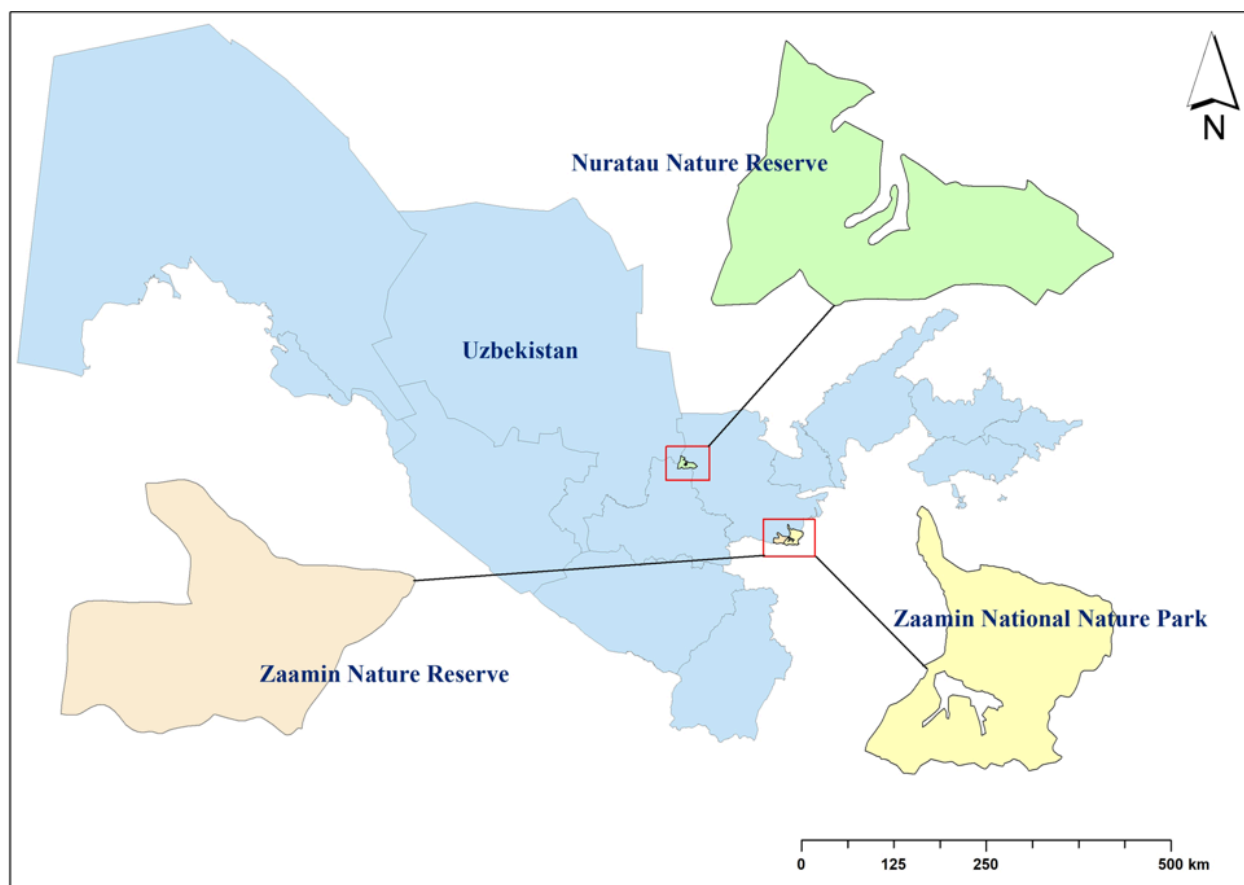


Figure 1. The map illustrates the location of the protected areas in the Jizzakh region.

Erysiphe species demonstrated the broadest host range, infecting 57 host plant species (41.6 % of the total), followed by *Leveillula* with 35 host plant species (25.4 %), and *Podosphaera* with 19 host plant species (13.8 %). *Sphaerotheca* was found on 11 host plant species (8.0 %), while the remaining genera—*Blumeria*, *Phyllactinia*, *Golovinomyces*, *Neoerysiphe*, and *Uncinula*—showed isolation to fewer host species. This comprehensive investigation highlights the wide distribution of powdery mildew fungi in the protected areas of the Jizzakh region, underscoring the need for further research to uncover their ecological roles and potential impacts.

Two species *Erysiphe platani* – on *Platanus orientalis* and *E. syringae* – on *Ligustrum* sp. were found for the first time for the mycobiota of Uzbekistan. Eleven species, 10 varieties of powdery mildew were recorded on 18 new host plant species index of Uzbekistan: *Blumeria graminis* – *Poa trivialis*, *Erysiphe cichoracearum* f. *lactucae* – *Lactuca orientalis*, *E. cichoracearum* f. *tanacetii*– *Lepidolopha komarowii*, *E. cruciferarum* – *Descurainia sophia*, *E. heraclei* – *Ferula penninervis*, *Ferula angreni* and *Physocaulis nodosus*, *Leveillula*

boraginacearum f. *lappulae* – *Pseudoheterocaryum szovitsianum*, *L. compositarum* f. *artemisiae* – *Artemisia oliveriana*, *L. compositarum* f. *helichrysi* – *Helichrysum nuratavicum*, *L. labiatarum* f. *dracocephali* – *Dracocephalum nuratavicum*, *L. labiatarum* f. *scutellariae* – *Scutellaria ramosissima*, *L. labiatarum* f. *phlomidis* – *Phlomis nubilans*, *L. umbelliferarum* f. *heraclei* – *Semenovia pimpinelloides*, *Podosphaera fugax* – *Geranium rotundifolium*, *Sphaerotheca fuliginea* f. *lophanthi* – *Lophanthus schtschurowskianus*, *Sph. fuliginea* f. *sedi* – *Pseudosedum lievenii*, *Sphaerotheca* sp. – *Geum kokanicum*.

Among them, *Helichrysum nuratavicum*, *Phlomis nubilans* are endemic species for Nuratau ridge and *Phlomis nubilans*, *Helichrysum nuratavicum* and *Platanus orientalis* are listed in the Red Data Book of Uzbekistan (2019).

Thirty-two hosts of family Asteraceae were infected with powdery mildew followed by Rosaceae (19), Lamiaceae (14), Poaceae (13), Brassicaceae (12), Apiaceae (10), Fabaceae Boraginaceae (8 each), Dipsacaceae, Polygonaceae (5 each), Scrophulariaceae, Geraniaceae

Table 1. In this section, the scientific name of host plants along with the powdery mildew fungi occurring on them are provided.

Host plant (scientific name)	Powdery mildew fungi (scientific name)	Host plant (scientific name)	Powdery mildew fungi (scientific name)
<i>Achillea</i> sp.	<i>Leveillula taurica</i> f. <i>achilleae</i>	<i>Dipsacus azureus</i>	<i>Sphaerotheca fuliginea</i> f. <i>dipsaci</i>
<i>Aegilops crassa</i>	<i>Blumeria graminis</i>	<i>Dodartia orientalis</i>	<i>Leveillula scrophulariacearum</i> f. <i>dodartiae</i>
<i>Aegilops cylindrica</i>	<i>Blumeria graminis</i>	<i>Dracocephalum nuratavicum</i>	<i>Leveillula labiatarum</i> f. <i>dracocephali</i>
<i>Aegilops triuncialis</i>	<i>Blumeria graminis</i>	<i>Erysimum</i> sp.	<i>Erysiphe cruciferarum</i> f. <i>erysimi</i>
<i>Alcea nudiflora</i>	<i>Erysiphe cichoracearum</i> f. <i>althaeae</i>	<i>Euphorbia</i> sp.	<i>Podosphaera euphorbiae</i>
<i>Alhagi maurorum</i>	<i>Leveillula alhagi</i>	<i>Eremogone griffithii</i>	<i>Leveillula caryophyllacearum</i> f. <i>arenariae</i>
<i>Alhagi</i> sp.	<i>Leveillula alhagi</i>	<i>Ferula angreni</i>	<i>Erysiphe heraclei</i>
<i>Alyssum alyssoides</i>	<i>Erysiphe cruciferarum</i>	<i>Ferula penninervis</i>	<i>Erysiphe heraclei</i>
<i>Alyssum minutum</i>	<i>Erysiphe cruciferarum</i>	<i>Fraxinus sogdiana</i>	<i>Phyllactinia fraxini</i>
<i>Alyssum dasycarpum</i>	<i>Erysiphe cruciferarum</i>	<i>Galium aparine</i>	<i>Neoerysiphe galii</i>
<i>Alyssum desertorum</i>	<i>Erysiphe cruciferarum</i>	<i>Galium pamiroalaicum</i>	<i>Neoerysiphe galii</i>
<i>Arctium umbrosum</i>	<i>Erysiphe cichoracearum</i> f. <i>cousiniae</i>	<i>Geranium linearilobum</i>	<i>Podosphaera fugax</i>
<i>Arctium lappa</i>	<i>Golovinomyces depressus</i>	<i>Geranium pusillum</i>	<i>Podosphaera fugax</i>
<i>Artemisia oliveriana</i>	<i>Leveillula compositarum</i> f. <i>artemisiae</i>	<i>Geum kokanicum</i>	<i>Sphaerotheca</i> sp.
<i>Artemisia vulgaris</i>	<i>Golovinomyces cichoracearum</i>	<i>Hedysarum</i> sp.	<i>Erysiphe communis</i> f. <i>hedysari</i>
<i>Asperugo procumbens</i>	<i>Erysiphe horridula</i>	<i>Helichrysum nuratavicum</i>	<i>Leveillula compositarum</i> f. <i>helichrysi</i>
<i>Astragalus</i> sp.	<i>Leveillula leguminosarum</i> f. <i>astragali</i>	<i>Heracleum lehmannianum</i>	<i>Leveillula umbelliferarum</i> f. <i>heraclei</i>
<i>Atraphaxis pyrifolia</i>	<i>Erysiphe atraphaxis</i>	<i>Hieracium</i> sp.	<i>Erysiphe cichoracearum</i> f. <i>ehieracium</i>
<i>Avena fatua</i>	<i>Blumeria graminis</i>	<i>Hippophae rhamnoides</i>	<i>Phyllactinia suffulta</i> f. <i>hippophaes</i>
<i>Bidens tripartita</i>	<i>Sphaerotheca fuliginea</i> f. <i>bidentis</i>	<i>Hordeum spontaneum</i>	<i>Blumeria graminis</i>
<i>Capparis spinosa</i>	<i>Leveillula capparidacearum</i> f. <i>capparidis</i>	<i>Hordeum bulbosum</i>	<i>Blumeria graminis</i>
<i>Carthamus lanatus</i> ssp. <i>turkestanicus</i>	<i>Leveillula compositarum</i> f. <i>carthami</i>	<i>Hypericum perforatum</i>	<i>Erysiphe hyperici</i>
<i>Centaurea besseriana</i>	<i>Leveillula compositarum</i> f. <i>centaureae</i>	<i>Hypericum scabrum</i>	<i>Leveillula guttiferarum</i>
<i>Cichorium intybus</i>	<i>Golovinomyces cichoracearum</i> <i>Sphaerotheca fuliginea</i>	<i>Juglans regia</i>	<i>Erysiphe juglandis</i>
<i>Chaerophyllum nodosum</i>	<i>Erysiphe heraclei</i>	<i>Lactuca orientalis</i>	<i>Erysiphe cichoracearum</i> f. <i>lactucae</i>
<i>Convolvulus arvensis</i>	<i>Erysiphe convolvuli</i> var. <i>convolvuli</i>	<i>Lepidium draba</i>	<i>Leveillula cruciferarum</i> f. <i>lepidii</i>
<i>Cousinia microcarpa</i>	<i>Erysiphe cichoracearum</i> f. <i>cousiniae</i>	<i>Lepidolopha komarowii</i>	<i>Erysiphe cichoracearum</i> f. <i>tanacetii</i>
<i>Cousinia</i> sp.	<i>Erysiphe cichoracearum</i> f. <i>cousiniae</i>	<i>Ligustrum</i> sp.	<i>Erysiphe syringae</i>
<i>Cousinia coronata</i>	<i>Leveillula compositarum</i> f. <i>cousiniae</i>	<i>Lindelofia anchusoides</i> ssp. <i>macrostyla</i>	<i>Erysiphe horridula</i> f. <i>lindelofiae</i>
<i>Crambe cordifolia</i> ssp. <i>kotschyana</i>	<i>Erysiphe communis</i> f. <i>crambes</i>	<i>Lomelosia micrantha</i>	<i>Leveillula datiscacearum</i> f. <i>scabiosae</i>
<i>Crataegus songarica</i>	<i>Phyllactinia guttata</i>	<i>Lomelosia songarica</i>	<i>Sphaerotheca fuliginea</i> f. <i>scabiosae</i>
<i>Crataegus turkestanica</i>	<i>Podosphaera oxyacanthae</i> f. <i>crataegi</i> <i>Phyllactinia guttata</i>	<i>Malus domestica</i>	<i>Podosphaera leucotricha</i>
<i>Crepis pulchra</i>	<i>Sphaerotheca fuliginea</i> f. <i>crepidis</i>	<i>Marrubium anisodon</i>	<i>Erysiphe labiatarum</i> f. <i>marrubii</i>
<i>Crepis</i> sp.	<i>Erysiphe cichoracearum</i> f. <i>crepidis</i>	<i>Medicago sativa</i>	<i>Erysiphe communis</i> f. sp. <i>medicaginis-sativae</i> <i>Leveillula leguminosarum</i> f. <i>medicaginis</i>
<i>Cydonia oblonga</i>	<i>Podosphaera oxyacanthae</i> f. <i>cydoniae</i>	<i>Melilotus officinalis</i>	<i>Erysiphe trifoliorum</i>
<i>Datisca cannabina</i>	<i>Leveillula datiscacearum</i> f. <i>datisciae</i>	<i>Morus alba</i>	<i>Phyllactinia suffulta</i> f. <i>moricola</i>
<i>Daucus carota</i>	<i>Leveillula umbelliferarum</i> f. <i>dauci</i>	<i>Nepeta schtschurowskiana</i>	<i>Sphaerotheca fuliginea</i> f. <i>lophanthi</i>
<i>Delphinium semibarbatum</i>	<i>Leveillula ranunculacearum</i> f. <i>delphinii</i>	<i>Ornithogalum gulnariense</i>	<i>Podosphaera fugax</i>
<i>Descurainia sophia</i>	<i>Erysiphe cruciferarum</i>	<i>Onobrychis chorassanica</i>	<i>Leveillula leguminosarum</i> f. <i>onobrychidis</i>
		<i>Origanum vulgare</i>	<i>Erysiphe labiatarum</i> f. <i>origami</i>

Host plant (scientific name)	Powdery mildew fungi (scientific name)
<i>Peganum harmala</i>	<i>Leveillula taurica</i> f. <i>pegani</i>
<i>Pentanema britannica</i>	<i>Erysiphe cichoracearum</i> f. <i>inulae</i>
<i>Phlomis nubilans</i>	<i>Erysiphe labiatarum</i> f. <i>phlomidi</i> <i>Leveillula labiatarum</i> f. <i>phlomidis</i>
<i>Phlomis thapsoides</i>	<i>Leveillula labiatarum</i> f. <i>phlomidis</i>
<i>Phlomis labiosa</i>	<i>Erysiphe labiatarum</i> f. <i>eremostachydis</i>
<i>Pistacia vera</i>	<i>Phyllactinia suffulta</i> f. <i>pistaciae</i>
<i>Plantago lanceolate</i>	<i>Leveillula plantaginis</i> , <i>Podosphaera plantaginis</i>
<i>Plantago major</i>	<i>Erysiphe cichoracearum</i> var. <i>plantaginis</i>
<i>Platanus orientalis</i>	<i>Erysiphe platani</i>
<i>Poa trivialis</i>	<i>Poa trivialis</i>
<i>Poa versicolor</i>	<i>Blumeria graminis</i>
<i>Poa bulbosa</i>	<i>Blumeria graminis</i>
<i>Polygonum aviculare</i>	<i>Erysiphe polygoni</i> f. <i>polygoni</i>
<i>Populus afghanica</i>	<i>Phyllactinia populi</i>
<i>Potentilla pedata</i>	<i>Sphaerotheca macularis</i>
<i>Potentilla reptans</i>	<i>Erysiphe thuenenii</i>
<i>Prangos pabularia</i>	<i>Leveillula umbelliferarum</i> f. <i>prangotis</i>
<i>Pseudoscedum lievenii</i>	<i>Sphaerotheca fuliginea</i> f. <i>sedi</i>
<i>Psychrogeton cabulicum</i>	<i>Podosphaera fusca</i>
<i>Prunus persica</i>	<i>Podosphaera pannosa</i>
<i>Prunus cerasus</i>	<i>Podosphaera tridactyla</i> f. <i>cerasi</i>
<i>Prunus erythrocarpa</i>	<i>Phyllactinia suffulta</i> f. <i>pruni</i> <i>Podosphaera tridactyla</i> f. <i>cerasi</i>
<i>Prunus bucharica</i>	<i>Podosphaera pannosa</i> , <i>Phyllactinia suffulta</i> f. <i>pruni</i>
<i>Pseudopodospermum inconspicuum</i>	<i>Leveillula compositarum</i> f. <i>scorzonerae</i>
<i>Pseudoheterocaryum szovitsianum</i>	<i>Leveillula boraginacearum</i> f. <i>lappulae</i>
<i>Ranunculus sericeus</i>	<i>Erysiphe aquilegiae</i> var. <i>ranunculi</i>
<i>Rochelia cardiosepala</i>	<i>Erysiphe horridula</i> f. <i>rocheliae</i>

Host plant (scientific name)	Powdery mildew fungi (scientific name)
<i>Rochelia sp</i>	<i>Erysiphe horridula</i> f. <i>rocheliae</i>
<i>Rosa canina</i>	<i>Podosphaera pannosa</i>
<i>Rosa persica</i>	<i>Podosphaera pannosa</i>
<i>Rosa beggeriana</i> var. <i>beggeriana</i>	<i>Podosphaera pannosa</i>
<i>Rosa ecae</i>	<i>Podosphaera pannosa</i>
<i>Rumex acetosa</i>	<i>Erysiphe polygoni</i> var. <i>rumicis</i>
<i>Rumex chalepensis</i>	<i>Erysiphe polygoni</i> var. <i>rumicis</i>
<i>Salvia austriaca</i>	<i>Golovinomyces salvia</i>
<i>Salvia scrophulariifolia</i>	<i>Leveillula compositarum</i> f. <i>perovskia</i>
<i>Scandix pecten-veneris</i>	<i>Erysiphe heraclei</i>
<i>Scutellaria ramosissima</i>	<i>Leveillula labiatarum</i> f. <i>scutellariae</i>
<i>Semenovia pimpinellioides</i>	<i>Leveillula umbelliferarum</i> f. <i>heraclei</i>
<i>Solenanthus circinnatus</i>	<i>Erysiphe horridula</i> f. <i>solenanthi</i> <i>Leveillula umbelliferarum</i> f. <i>seseli</i>
<i>Solenanthus turkestanicus</i>	<i>Erysiphe horridula</i> f. <i>solenanthi</i>
<i>Sonchus asper</i>	<i>Erysiphe cichoracearum</i> f. <i>sonchi</i>
<i>Tanacetopsis mucronata</i>	<i>Erysiphe cichoracearum</i> f. <i>tanacetii</i>
<i>Taraxacum officinale</i>	<i>Erysiphe cichoracearum</i> f. <i>taraxaci</i>
<i>Taraxacum maracandicum</i>	<i>Podosphaera erigerontis</i> – <i>canadensis</i>
<i>Trifolium pretense</i>	<i>Erysiphe trifolii</i>
<i>Thinopyrum intermedium</i> ssp. <i>intermedium</i>	<i>Blumeria graminis</i>
<i>Ulmus laevis</i>	<i>Uncinula ulmi</i>
<i>Urtica dioica</i>	<i>Erysiphe urticae</i>
<i>Verbascum songaricum</i>	<i>Leveillula verbasci</i>
<i>Verbena officinalis</i>	<i>Erysiphe cichoracearum</i> f. <i>verbenae</i>
<i>Veronica argute-serrata</i>	<i>Erysiphe cichoracearum</i> f. <i>veronicae</i>
<i>Vitis vinifera</i>	<i>Erysiphe necator</i>
<i>Vickifunkia thomsonii</i>	<i>Sphaerotheca fuliginea</i> f. <i>senecionis</i>
<i>Ziziphora tenuior</i>	<i>Erysiphe labiatarum</i> f. <i>ziziphorae</i>

(4 each), Euphorbiaceae, Oleaceae, Plantaginaceae, Ranunculaceae, Rubiaceae, Hypericaceae, Malvaceae (2 each), Capparaceae, Caryophyllaceae, Crassulaceae, Datisceae, Elaeagnaceae, Juglandaceae, Anacardiaceae, Moraceae, Peganaceae, Platanaceae, Salicaceae, Ulmaceae, Urticaceae, Verbenaceae, Vitaceae (1 each).

The highest number of powdery mildew species was reported in the following host genera: *Plantago*, *Prunus* (3 species each, 5.26% of the total species number), *Cichorium*, *Arctium*, *Artemisia*, *Cousinia*, *Crataegus*, *Crepis*, *Lomelosia*, *Medicago*, *Phlomis*, *Potentilla*, *Salvia*, *Solenanthus* and *Taraxacum* (2 species each, 3.50%),

while other plant genera host one powdery mildew species per genus.

The recorded powdery mildew species were found on 31 medicinal species such as *Alcea nudiflora*, *Alhagi maurorum*, *Capparis spinosa*, *Cichorium intybus*, *Crataegus songarica*, *C. turkestanica*, *Crambe cordifolia* ssp. *kotschyana*, *Hippophae rhamnoides*, *Hypericum perforatum*, *Juglans regia*, *Malus domestica*, *Medicago sativa*, *Morus alba*, *Nepeta schtschurowskiana*, *Pistacia vera*, *Plantago lanceolate*, *P. major*, *Prunus erythrocarpa*, *P. bucharica*, *Helichrysum nuratavicum*, *Rosa canina*, *R. persica*, *R. beggeriana* var. *beggeriana*, *R. ecae*, *Rumex acetosa*, *R. chalepensis*, *Taraxacum*

officinale, *T. maracandicum*, *Urtica dioica*, *Vitis vinifera*, *Ziziphora tenuior* etc.

This work represents itself as a checklist of powdery mildew fungi in the Jizzakh region of protected areas. The fungal species listed below have been arranged in alphabetical order.

Blumeria graminis (DC.) Speer

(= *Erysiphe communis* f. *graminis* (DC.) Fr., *Alphitomorpha communis* var. *graminearum* Wallr., *Erysiphe graminis* DC., *Tigridia graminis* (DC.) Trevis.)

Host: Poaceae

Poa trivialis (2015) NNR (Xayatsay V.) - First record on *Poa trivialis* in Uzbekistan.

Poa versicolor (2015) NNR (Tikchasay V.)

Poa bulbosa (2010), NNR (Beshbarmog V.) (2019–2022) ZNNP (Usmanlisay, Qorongisay V.)

Thinopyrum intermedium subsp. *intermedium* (= *Agropyron trichophorum*) (2022) ZNNP (Ettikechusay V.)

Aegilops crassa (2010) NNR (Xayatsay V.)

Aegilops cylindrica (2012), NNR (Qarisay V.)

Aegilops triuncialis (2022) ZNNP (Usmanlisay V.)

Hordeum bulbosum (1983) ZNR (Kulsay V.), (2009–20120) NNR (Xayatsay V.), (2019) ZNNP (Usmanlisay V.), (2021) ZNNP (Boytepa V.)

Hordeum spontaneum (2021) ZNNP (Qo'riq V.)

Avena fatua (2022) ZNNP (Usmanlisay V.)

Erysiphe aquilegiae var. ranunculi (Grev.) R.Y. Zheng & G.Q. Chen.

Host: Ranunculaceae

Ranunculus sericeus (2016) NNR (Xayatsay V.).

E. atraphaxis (Golovin) U. Braun & S. Takam.

Host: Polygonaceae

Atraphaxis pyrifolia (2019) ZNNP (O'riklisay V.).

E. communis f. crambes Jacz.

Host: Brassicaceae

Crambe cordifolia ssp. *kotschyana* (Boiss.) Jafri. (2014) NNR (Gurdara V.), (2021) ZNNP (Qorong'isay V.).

E. communis f. dianthi Jacz.

Host: Caryophyllaceae

Dianthus helenae (2017) NNR (Beshbarmaq V.).

E. communis f. hedysari Jacz.

Host: Fabaceae

Hedysarum sp.- (2010) NNR (Beshbarmaq V.).

E. communis f. sp. medicaginis-sativae Hammarl.

Host: Fabaceae

Medicago sativa (2019) ZNNP (O'riklisay V.).

E. cichoracearum f. althaeae Jacz.

Host: Malvaceae

Alcea nudiflora (2010) NNR (Xayatsay V.), (2019) ZNNP (O'riklisay V.).

E. cichoracearum f. lactucae Jacz.

Host: Asteraceae

Lactuca orientalis (2010) NNR (Xayatsay V.), (2012) NNR (Majrumsay V.) - Note: First record on *Lactuca orientalis* in Uzbekistan.

E. cichoracearum f. tanacetii Jacz.

Host: Asteraceae

Lepidolopha komarowii (2015) NNR (Xayatboshi V.) - Note: First record on *Lepidolopha komarowii* in Uzbekistan.

E. cichoracearum f. veronicae Jacz.

Host: Scrophulariaceae

Veronica argute-serrata (2010) NNR (Beshbarmog V.).

E. cichoracearum f. verbenae Jacz.

Host: Verbenaceae

Verbena officinalis (2010) NNR (Xayatboshi V.), (2017) NNR (Xayatsay V.).

E. cichoracearum f. crepidis Jacz.

Host: Asteraceae

Crepis sp. (2019) ZNNP (Ettikechusay V.).

E. cichoracearum f. euhieracium S. Blumer.

Host: Asteraceae

Hieracium sp. (2019) ZNNP (Sherbulaq V.).

E. cichoracearum f. tanacetii Jacz.

Host: Asteraceae

Tanacetopsis mucronata (2019) ZNR (Qizilmazar V.).

E. cichoracearum f. taraxaci Jacz .

Host: Asteraceae

Taraxacum officinale – (2021) ZNNP (Boytepa V.).

E. cichoracearum f. sonchi Jacz .

Host: Asteraceae

Sonchus asper (2021) ZNNP (Sherbulaq, Irg'aylisay V.).

E. cichoracearum* f. *cousinia (Jacq.) Golov.

Host: Asteraceae

Cousinia sp. (2021) ZNNP (Boytepa V.).*Cousinia microcarpa* (2022) ZNNP (O'riklisay).***E. cichoracearum* var. *plantaginis*** (Link).

Host: Plantaginaceae

Plantago major (2021) ZNNP (Qorong'isay V.).***E. cichoracearum* f. *inulae*** Jacq.

Host: Asteraceae

Pentanema britannica (2022) ZNNP (Irg'aylisay V.)***E. cruciferarum*** Opiz ex L. Junell.

(= *Erysiphe communis* (Wallr.) Link., *Erysiphe communis* (Wallr.) Schltdl., *Erysiphe cruciferarum* var. *longispora* G.J.M. Gorter., *Erysiphe pisi* var. *cruciferarum* (Opiz ex L. Junell) Jalongo., *Erysiphe radulescui* Docea.)

Host: Brassicaceae

Alyssum dasycarpum (2010–2012) NNR (Tikchasay, Qarisay V.).*Alyssum alyssoides* (2010) NNR (Xayatsay V.).*Alyssum desertorum* (2020) ZNNP (Sufa V.), (2022) ZNNP (Qorong'isay V.).*Alyssum minutum* (2020) ZNNP (Usmanlisay V.).*Descurainia sophia* (2022) ZNNP (Usmanlisay V.) - Note: First record on *Descurainia sophia* in Uzbekistan.***E. cruciferarum* f. *erysimi*** (Jacq.).

Host: Brassicaceae

Erysimum sp. (2022) ZNNP (Usmanlisay V.).***E. convolvuli* var. *convolvuli***

Host: Convolvulaceae

Convolvulus arvensis (2010) NNR (Xayatsay V.), (2021) ZNNP (Usmanlisay V.).***E. horridula* f. *asperuginis*** S. Blumer.

Host: Boraginaceae

Asperugo procumbens (2010) NNR (Xayatsay V.), (2019) ZNNP (O'riklisay V.).***E. horridula* f. *lindelofiae*** Golovin.

Host: Boraginaceae

Lindelofia anchusoides ssp. *macrostyla* (2010) NNR (Beshbarmaq Mt.), (2018) ZNNP (O'riklisay).***E. horridula* f. *rocheliae*** Golovin.

Host: Boraginaceae

Rochelia sp. (2009) NNR (Tikchasay V.) *Rochelia cardiosepala* (2012) NNR (Qarisay, Gurdara V.).***E. horridula* f. *solenanthi*** Jacq.

Host: Boraginaceae

Solenanthus circinnatus (2010) NNR (Parandoz V.).*Solenanthus turkestanicus* (2011) NNR (Majrumsay V.).***E. heraclei*** DC.

(= *Erysiphe heraclei* var. *himalayensis* Y.S. Paul & V.K. Thakur.)

Host: Apiaceae

Ferula penninervis (2017) NNR (Xayatsay, Beshbarmaq V.) - Note: First record on *Ferula penninervis* in Uzbekistan.*Ferula angreni* (2017) NNR (Xayatsay V.) - First record on *Ferula angreni* in Uzbekistan.*Chaerophyllum nodosum* (2014) NNR (Gurdara V.).*Scandix pecten veneris* (2012) NNR (Xayatsay V.), (2019) ZNNP (Boytepa V.), (2022) ZNNP (Qorong'isay V.).***E. thuemenii*** U. Braun (= *E. communis* f. *potentillae* Jacq.).

Host: Rosaceae

Potentilla reptans (2019) ZNNP (Usmanlisay V.).***E. trifolii*** Grev. (= *Erysiphe martii* Lév., *Microsphaera martii* (Lév.) YS Paul & VK Thakur., *Microsphaera trifolii* (Grev.) U. Braun).

Host: Fabaceae

Trifolium pretense (2021) ZNNP (Usmanlisay V.).***E. trifoliorum*** (Wallr.) U. Braun.

Host: Fabaceae

Melilotus officinalis (2019) ZNNP (O'riklisay V.).***E. hyperici*** (Wallr.) S. Blumer.

Host: Hypericaceae

Hypericum perforatum (2012) NNR (Qarisay V.).***E. juglandis*** (Golovin) U. Braun & S. Takam.(= *Microsphaera juglandis* Golovin.).

Host: Juglandaceae

Juglans regia (2019) ZNNP (Usmanlisay V.).***E. labiatarum* f. *origani*** (H.A. Dietr.) Jacq.

Host: Lamiaceae

Origanum vulgare (2014) NNR (Parandoz V.).***E. labiatarum* f. *phlomidis*** Jacq.

Host: Lamiaceae

- Phlomis nubilans* (2014), NNR (Majrumsay V.).
- E. labiatarum** f. *leonuri* Jacz.
Host: Lamiaceae
Leonurus turkestanicus (2017), NNR (Xayatboshi V.).
- E. labiatarum** f. *ziziphorae* Pospelov.
Host: Lamiaceae
Ziziphora tenuior (2019) ZNNP (Yettikechusay V.).
- E. labiatarum** f. *eremostachydis* Golovin.
Host: Lamiaceae
Phlomoides labiosa (1983) ZNR (Guralashsay V.).
- E. labiatarum** f. *marrubii* Jacz.
Host: Lamiaceae
Marrubium anisodon (2021) ZNNP (Qorong'isay V.).
- E. necator** Schwein.
(= *Erysiphe necator* var. *ampelopsidis* (Peck) U. Braun & S. Takam., *Oidium tuckeri* Berk., *Uncinula americana* Howe., *Uncinula ampelopsidis* Peck., *Uncinula necator* (Schwein.) Burrill., *Uncinula necator* var. *ampelopsidis* (Peck) U. Braun.).
Host: Vitaceae
Vitis vinifera (2016) NNR (Qarisay V.), (2022) ZNNP (Qorong'isay V.).
- E. platani** (Howe) U. Braun (= *Microsphaera platani* Howe.)
Host: Platanaceae
Platanus orientalis (2022) ZNNP (Usmanliysay V.) -
Note: First report in Uzbekistan.
- E. polygoni** f. *polygoni* DC.
Host: Polygonaceae
Polygonum aviculare (2010) NNR (Qarisay V.), (2019) ZNNP (O'riklisay V.), (2022) ZNNP (Usmanliysay V.).
- E. polygoni** var. *rumicis* Y.S. Paul & V.K. Thakur.
Host: Polygonaceae
Rumex chalepensis (2017) NNR (Xayatsay V.).
Rumex acetosa (2021) ZNNP (Usmanliysay V.).
- E. syringae** Schwein. (= *Microsphaera syringae* (Schwein.) H. Magn.).
Host: Oleaceae
Ligustrum sp. (2022) ZNNP (Qorong'isay V.) - Note:
First report in Uzbekistan.

- E. urticae** (Wallr.) S. Blumer
Host: Urticaceae
Urtica dioica (2014) NNR (Xayatsay V.).
- Golovinomyces cichoracearum** (DC.) VP Heluta.
(= *Erysiphe communis* var. *cichoracearum* (DC.) Link., *Erysiphe cichoracearum* var. *luvungae* M.S. Patil & Maham., *Erysiphe cichoracearum* var. *saussureae* Y.S. Paul & V.K. Thakur., *Erysiphe cichoracearum* var. *transvaalensis* G.J.M. Gorter & Eicker., *Golovinomyces cichoracearum* var. *latisporus* (U. Braun) U. Braun., *Golovinomyces cichoracearum* var. *transvaalensis* (G.J.M. Gorter & Eicker) U. Braun., *Oidium asteris-punicea* Peck., *Oidium tabaci* Thüm.).
Host: Asteraceae
Artemisia vulgaris (2019) ZNR (Qashqasuv V.).
- G. salviae** (Jacz.) M. Scholler, U. Braun & Anke Schmidt.
(= *Erysiphe biocellata* var. *salviae* (Jacz.) VP Heluta., *Erysiphe labiatarum* f. *salviae* Jacz., *Erysiphe salviae* (Jacz.) S. Blumer., *Leveillula labiatarum* f. *salviae* (Jacz.) Golovin.).
Host: Lamiaceae
Salvia austriaca (2017) NNR (Xayatsay V.).
- G. depressus** (Wallr.) VP Heluta.
(= *Erysiphe cichoracearum* f. *bardanae* (Wallr.) Jacz., *Erysiphe communis* f. *depressa* (Wallr.) Fr., *Erysiphe depressa* (Wallr.) Link., *Erysiphe depressa* var. *artemiciae* Link., *Erysiphe depressa* var. *bardanae* Wallr.).
Host: Asteraceae
Arctium lappa (2009) NNR (Xayatsay V.).
- Golovinomyces cichoracearum** (DC.) VP Heluta.
(= *Erysiphe communis* var. *cichoracearum* (DC.) Link., *Erysiphe cichoracearum* DC., *Erysiphe cichoracearum* f. *cichorii* S. Blumer., *Erysiphe cichoracearum* var. *latispora* U. Braun., *Erysiphe cichoracearum* var. *luvungae* M.S. Patil & Maham., *Erysiphe cichoracearum* var. *saussureae* Y.S. Paul & V.K. Thakur., *Erysiphe cichoracearum* var. *transvaalensis* G.J.M. Gorter & Eicker., *Golovinomyces cichoracearum* var. *latisporus* (U. Braun) U. Braun., *Golovinomyces cichoracearum* var. *transvaalensis* (G.J.M. Gorter & Eicker) U. Braun., *Oidium asteris-punicea* Peck., *Oidium tabaci* Thüm.).
Host: Asteraceae
Cichorium intybus (2017) NNR (Xayatsay V.).

***Leveillula alhagi* (Sorokīn) U. Braun.**

(= *Erysiphe alhagi* Sorokīn., *Leveillula leguminosarum* f. *alhagi* (Sorokīn) Golovin.).

Host: Fabaceae

Alhagi sp. (2009) NNR (Xayatsay V.), (2017) NNR (Majrumsay V.).

Alhagi maurorum (2021) ZNNP (Boytepa V.).

***L. boraginacearum* f. *lappulae* (Jacz.) Golov.**

Host: Boraginaceae

Pseudoheterocaryum szovitsianum (2022)

ZNNP (O'riklisay V.) - Note: First record on

Pseudoheterocaryum szovitsianum in Uzbekistan.

***L. capparidacearum* f. *capparidis* (Jacz.) Golovin.**

Host: Capparaceae

Capparis spinosa (2019–2021) ZNNP (O'riklisay, Usmanlisay V.).

***L. caryophyllacearum* f. *arenariae* Golovin.**

Host: Caryophyllaceae

Arenaria griffithii (2015–2016) NNR (Xaytbashi V.).

***L. compositarum* f. *scorzonerae* (Kuprev.) Golovin.**

Host: Asteraceae

Pseudopodospermum inconspicuum (2022) ZNNP (Ettikechusay V.).

***L. compositarum* f. *artemisiae* (Jacz.) Golovin.**

Host: Asteraceae

Artemisia oliveriana (2017) NNR (Majrumsay V.) - Note: First record on *Artemisia oliveriana* in Uzbekistan.

***L. compositarum* f. *helichrysi* (Jacz.) Golovin.**

Host: Asteraceae

Helichrysum nuratavicum (2015) NNR (Fargun V.)

- Note: First record on *Helichrysum nuratavicum* in Uzbekistan.

***L. compositarum* f. *centaureae* (Jacz.) Golovin.**

Host: Asteraceae

Centaurea besseriana (2010–2014) NNR (Xaytbashi - Majrumsay V.).

***L. compositarum* f. *carthami* (Jacz.) Golovin.**

Host: Asteraceae

Carthamus lanatus ssp. *turkestanicus* (2015) NNR (Xayatsay V.).

***L. compositarum* f. *cousinia* (Jacz.) Golovin.**

Host: Asteraceae

Arctium umbrosum (2016) NNR (Tikchasay V.).

Cousinia coronata (2019) ZNNP (Yettikechusay V.).

***L. compositarum* f. *perovskiae* Kurbana.**

Host: Lamiaceae

Salvia scrophulariifolia (2017) NNR (Beshbarmaq V.).

***L. cruciferarum* f. *lepidii* (Jacz.) Golovin.**

Host: Brassicaceae

Lepidium draba (2014) NNR (Xayatsay V.).

***L. datiscearum* f. *datisciae* (Jacz.) Golovin.**

Host: Datisceae

Datisca cannabina (2014) NNR (Majrumsay V.),

(2016) NNR (Tikchasay V.).

***L. dipsacacearum* f. *scabiosae* (Jacz.) Golovin.**

Host: Dipsacaceae

Lomelosia micrantha (2022) ZNNP (Usmanlisay V.).

***L. guttiferarum* Golovin.**

Host: Hypericaceae

Hypericum scabrum (2016) NNR (Tikchasay V.).

***L. labiatarum* f. *dracocephali* Golovin.**

Host: Lamiaceae

Dracocephalum nuratavicum (2015) NNR

(Andibaraut V.) - Note: First record on *Dracocephalum nuratavicum* in Uzbekistan.

***L. labiatarum* f. *scutellariae* (Jacz.) Golovin.**

Host: Lamiaceae

Scutellaria ramosissima (2015) NNR (Xaytbashi-

Xayatsay V.) - Note: First record on *Scutellaria ramosissima* in Uzbekistan.

Scutellaria sp.- (2016) NNR (Tikchasay V.).

***L. labiatarum* f. *phlomidis* (Jacz.) Golovin.**

Host: Lamiaceae

Phlomis thapsoides (2010) NNR (Xayatsay V.).

Phlomis nubilans (2015) NNR (Fargun V.) - Note: First record on *Phlomis nubilans* in Uzbekistan.

***L. leguminosarum* f. *astragali* (Jacz.) Golovin.**

Host: Fabaceae

Astragalus sp. (20221) ZNNP (Sherbuloq V.).

***L. leguminosarum* f. *onobrychidis* Golovin.**

Host: Fabaceae

- Onobrychis chorassanica* (2015) NNR (Fargun V.).
- L. leguminosarum f. medicaginis** (Jacz.) Golovin.
Host: Fabaceae
Medicago sativa (2017) NNR (Xayatsay V.).
- L. plantaginis** Golovin.
Host: Plantaginaceae
Plantago lanceolata (2010) NNR (Xayatsay V.).
- L. scrophulariacearum f. dodartiae** (Jacz.) Golovin.
Host: Scrophulariaceae
Dodartia orientalis (2010) NNR (Xayatbashi V.).
- L. taurica f. pegani** Jacz.
Host: Peganaceae
Peganum harmala (2010) NNR (Tikchasay V.).
- L. taurica f. achilleae** Jacz.
Host: Asteraceae
Achillea sp. (2019) ZNNP (O'riklisay V.).
- L. umbelliferarum f. dauci** Golovin.
Host: Apiaceae
Daucus carota (2010) NNR Xayatsay V.).
- L. umbelliferarum f. seseli** Golovin.
Host: Boraginaceae
Solenanthus circinnatus (2015) NNR (Xayatbashi V.).
- L. umbelliferarum f. prangotis** Golovin.
Host: Apiaceae
Prangos pabularia (2017) NNR (Xayatsay V.).
- L. umbelliferarum f. heraclei** Golovin.
Host: Apiaceae
Heracleum lehmannianum (2018) ZNNP (O'riklisay V.).
Semenovia pimpinelloides (2022) ZNNP (Qorong'isay V.) - Note: First record on *Semenovia pimpinelloides* in Uzbekistan.
- L. ranunculacearum f. delphinii** Golovin.
Host: Ranunculaceae
Delphinium semibarbatum (2019) ZNNP (Yettikechusay V.).
- L. verbasci** (Jacz.) Golovin. (= *Leveillula taurica* f. *verbasci* Jacz.).
Host: Scrophulariaceae
Verbascum songaricum (2015) NNR (Tikchasay V.),
- (2016) NNR (Xayatbashi V.).
- Neoerysiphe galii** (S. Blumer) U. Braun.
(= *Erysiphe galii* S. Blumer).
Host: Rubiaceae
Galium aparine - (1983) ZNR (Kulsay V.), (2022) ZNNP (O'riklisay V.).
Galium pamiroalaicum (2016) NNR (Parandoz V.).
- Phyllactinia suffulta f. pistaciae** Jacz.
Host: Anacardiaceae
Pistacia vera (2015) NNR (Xayatsay V.), (2021) ZNNP (Boytepa V.).
- P. populi** (Jacz.) Y.N. Yu.
(= *Phyllactinia suffulta* f. *populi* Jacz.).
Host: Salicaceae
Populus afghanica (2014) NNR (Majrumsay V.), (2019–2021) ZNNP (Qorong'isay-O'riklisay V.).
- P. suffulta f. pruni** Golov.
Host: Rosaceae
Prunus bucharica (2019–2021) ZNNP (O'riklisay – Usmanliysay V.).
Prunus erythrocarya (2018) ZNNP (O'riklisay V.).
- P. suffulta f. hippophaes** Jacz.
Host: Elaeagnaceae
Hippophae rhamnoides (2022) ZNNP (Umanlisay V.).
- P. suffulta f. moricola** Jacz.
Host: Moraceae
Morus alba (2009–2010–2016) NNR (Xayatsay, Tikchasay V.), (2021) ZNNP (Qorong'isay V.).
- P. guttata** (Wallr.) Lév.
(= *Phyllactinia berberidis* Palla., *Phyllactinia betulae* (DC.) Fuss., *Phyllactinia corylea* (Pers.) P. Karst., *Phyllactinia suffulta* (Rebent.) Sacc.).
Host: Rosaceae
Crataegus turkestanica (2017) NNR (Xayatsay V.).
Crataegus songarica (2022) ZNNP (Yettikechusay V.).
- P. fraxini** (DC.) Fuss.
(= *Erysiphe communis* f. *lamprocarpa* (Wallr.) Fr., *Erysiphe fraxini* DC., *Erysiphe lamprocarpa* (Wallr.) Link.).
Host: Oleaceae
Fraxinus sogdiana (2017) NNR (Qarisay V.).

Podosphaera euphorbiae (Castagne) U. Braun & S. Takam.
(= *Sphaerotheca euphorbiae* (Castagne) E.S. Salmon.,
Sphaerotheca tomentosa G.H. Otth.).
Host: Euphorbiaceae
Euphorbia sp. (2016) NNR (Tikchasay V.).

P. fugax (Penz. & Sacc.) U. Braun & S. Takam.
(= *Erysiphe communis* var. *geranii* Klotzsch.,
Sphaerotheca fugax Penz. & Sacc.).
Host: Geraniaceae
Geranium linearilobum (2013) NNR (Gurdara V.).
Geranium pusillum (2010) NNR (Tikchasay V.).
Geranium rotundifolium (2012) NNR (Gurdara V.).
- Note: First record on *Geranium rotundifolium* in Uzbekistan.

P. fusca (Fr.) U. Braun va Shishkoff.
(= *Podosphaera phaseoli* (Z.Y. Zhao) U. Braun & S. Takam.,
Podosphaera xanthii (Castagne) U. Braun & Shishkoff.,
Sphaerotheca astragali var. *phaseoli* Z.Y. Zhao.,
S. calendulae (Malbr. & Roum.) Malbr.,
S. cucurbitae (Jacq.) Z.Y. Zhao.,
S. fuliginea f. *calendulae* (Malbr. & Roum.) Jacq.,
S. fuliginea f. *cucurbitae* Jacq.,
S. fusca (Fr.) S. Blumer.,
S. fuscata (Berk. & M.A. Curtis) Serbinow.,
S. indica Patw.,
S. melampyri L. Junell.,
S. microcarpa Hazsl.,
S. phaseoli (Z.Y. Zhao) U. Braun.,
S. verbenae Sävul. & Negru.,
S. xanthii (Castagne) L. Junell.).
Host: Asteraceae
Psychrogeton cabulicum (2016) NNR (Tikchasay V.).

P. tridactyla* f. *cerasi Jacz.
Host: Rosaceae
Prunus cerasus (2017) NNR (Xayatsay V.).
Prunus erythrocarpa (2018) ZNNP (O'riklisay V.).

P. leucotricha (Ellis & Everh.) E.S. Salmon.
(= *Sphaerotheca leucotricha* Ellis & Everh.).
Host: Rosaceae
Malus domestica (2009) NNR (Majrumsay V.), (2021) ZNNP (Ettikechusay V.).

P. erigerontis-canadensis (Lév.) U. Braun & T.Z. Liu. (= *Erysiphe erigerontis-canadensis* Lév.,
Sphaerotheca erigerontis-canadensis (Lév.) L. Junell.).
Host: Asteraceae
Taraxacum maracandicum (1983) ZNR (Guralashsay V.).

P. euphorbiae (Castagne) U. Braun & S. Takam.
(= *Sphaerotheca euphorbiae* (Castagne) E.S. Salmon.,

S. tomentosa G.H. Otth.).
Host: Euphorbiaceae
Euphorbia sp. (2016) NNR (Xayatsay V.).

P. oxyacanthae* f. *cydoniae Jacz.
Host: Rosaceae
Cydonia oblonga (1956) ZNR (Guralashsay V.).

P. oxyacanthae* f. *crataegi Maurizio.
Host: Rosaceae
Crataegus turkestanica (2021) ZNNP (Yetikechusay V.).

P. plantaginis (Castagne) U. Braun & S. Takam.
(= *Erysiphe plantaginis* Castagne.,
Sphaerotheca plantaginis (Castagne) L. Junell.).
Host: Plantaginaceae
Plantago lanceolata (2016) NNR (Tikchasay V.).

P. pannosa (Wallr.) de Bary.
(= *Erysiphe pannosa* (Wallr.) Link.,
Leucothallia pannosa (Wallr.) Trevis.,
Oidium forsythiae Bunkina.,
O. leucoconium Desm.,
O. leuconium Desm.,
Sphaerotheca macularis f. *rosae* Jacz.,
S. pannosa (Wallr.) Lév.,
S. pannosa var. *persicae* Woron.,
S. pannosa var. *rosae* Woron.,
S. persicae (Woron.) Erikss.,
S. rosae (Jacq.) Z.Y. Zhao.).
Host: Rosaceae
Rosa canina (2010–2012) NNR (Xayatsay - Gurdarasay V.).
Rosa beggeriana var. *tilanchi* (2011) NNR (Majrumsay V.), (2021) ZNNP (Sufa-Usmanlisay V.).
Rosa persica (2011–2017) NNR (Xayatsay V.).
Rosa ecae (2021–2022) ZNNP (Yetikechusay - O'riklisay V.).
Prunus bucharica (2012) NNR (Tikchasay V.).
Prunus persica (2009) NNR (Xayatsay V.).

Sphaerotheca fuliginea* f. *scabiosae Jacz.
Host: Dipsacaceae
Lomelosia songarica (1983) ZNR (Guralashsay V.), (2010) NNR (Beshbarmaq V.).

S. fuliginea* f. *crepidis Jacz.
Host: Asteraceae
Crepis pulchra (2019) ZNNP (O'riklisay V.).

S. fuliginea* f. *senecionis Jacz.
Host: Asteraceae
Vickifunkia thomsonii (2022) ZNNP (Irgaylisay V.).

***S. fuliginea* f. *bidentis* Jacz.**

Host: Asteraceae

Bidens tripartite (2018) ZNNP (O'riklisay V.).***S. fuliginea* f. *dipsaci* Jacz.**

Host: Dipsacaceae

Dipsacus azureus (2010) NNR (Beshbarmaq V.), (2021) ZNNP (Usmanlisay V.).***S. fuliginea* f. *lophanthi* Jacz.**

Host: Lamiaceae

Nepeta schtschurowskiana (2015–2016–2017) NNR (Xayatbashi, Tikchasay, Beshbarmaq V.) - Note: First record on *Lophanthus schtschurowskianus* in Uzbekistan.***S. fuliginea* f. *sedi* Kalymb.**Host: Crassulaceae - *Pseudosedum lievenii* (2012) NNR (Gurdara V.) - Note: First record on *Pseudosedum lievenii* in Uzbekistan.***S. macularis* f. *potentillae* Jacz.**

Host: Rosaceae

Potentilla pedata (2016) NNR (Tikchasay V.).***Sphaerotheca* sp.**

Host: Rosaceae

Geum kokanicum (2015) NNR (Xayatboshi V.) - Note: First record on *Geum kokanicum* in Uzbekistan.***Uncinula ulmi* M.N.Kusnezowa.**

Host: Ulmaceae

Ulmus laevis (2017) NNR (Qarisay V.).**DISCUSSION**

It is known that the diversity of the powdery mildew fungi is closely related to the diversity of the plant flora. Uzbekistan's plant flora consists of more than 4,500 species and 88 species (334 forms) of powdery

mildew fungi were registered on 778 host plant species (Gaponenko et al. 1983). The plant flora from protected areas of the Jizzakh region includes 1986 species of 645 genera and 115 families (Tojibaev et al. 2015) and found 57 species, 69 forms and 4 varieties of powdery mildew on 137 host plant species from 34 families.

The distribution of powdery mildew species in host plants is given based on the regions of Jizzakh region in which they are distributed. The largest number of powdery mildew and host plants were found in the Nuratau Nature Reserve (8 genera, 40 species, 41 forms, 3 forms, of the total species number 70.17%), followed by the Zaamin National Nature Park (7 genera, 35 species, 32 forms, 3 varieties, of the total species number 61.40%), Zaamin Nature Reserve (8 genera, 20 species, 36 forms, 2 varieties, of the total species number 35.08 %).

It is noted that studies on powdery mildew fungi of many regions of Uzbekistan including the Anger river basin, and Fergana valley carried out by some mycologists (Panfilova & Gaponenko 1963; Gaponenko et al. 1983; Abdurazakov et al. 2021). The diversity of powdery mildew fungi in protected areas of the Jizzakh region has been compared with their research results (Table 2).

This diversity of powdery mildew fungi of protected areas of the Jizzakh region is represented by 9 genera and 57 species, 69 forms and 4 varieties species and has approximately 30.80% of the currently known mildew fungi biota of Uzbekistan. On the territory of protected areas of the Jizzakh region, the powdery mildew diseases occur frequently and severely damage plants belonging to *Aegilops*, *Alhagi*, *Artemisia*, *Alyssum*, *Capparis*, *Cousinia*, *Convolvulus*, *Ferula*, *Morus*, *Populus*, *Rosa*, *Rumex*, and *Trifolium*.

The present checklist is the third work about powdery mildew microfungi of Uzbekistan and serves as one of the sources for a complete list of powdery mildew microfungi of the Republic of Uzbekistan.

Table 2. Comparison of the powdery mildew diversity of protected areas of the Jizzakh region with other regions of Uzbekistan.

Study areas	Plant flora species	Powdery mildew	Powdery mildew host plant species (Percentage towards overall flora)
Uzbekistan (Gaponenko et al. 1983)	4500	88 species, 334 forms	778 (17.28 %)
Angren river basin (Panfilova & Gaponenko 1963)	1500	25 species, 100 forms and 4 varieties	164 (10.93%)
Fergana Valley (Abdurazakov et al. 2021)	2625	67 species	153 (5.82%)
Jizzakh region (this research)	1986	57 species, 69 forms and 4 varieties	137 (6.89 %)

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Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.
Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK
Dr. George Mathew, Kerala Forest Research Institute, Peechi, India
Dr. John Noyes, Natural History Museum, London, UK
Dr. Albert G. Orr, Griffith University, Nathan, Australia
Dr. Sameer Padhye, Katholieke Universiteit Leuven, Belgium
Dr. Nancy van der Poorten, Toronto, Canada
Dr. Kareen Schnabel, NIWA, Wellington, New Zealand
Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
Dr. M. Nithyanandan, Environmental Department, La Ala Al Kuwait Real Estate. Co. K.S.C., Kuwait
Dr. Himender Bharti, Punjabi University, Punjab, India
Mr. Purnendu Roy, London, UK
Dr. Saito Motoki, The Butterfly Society of Japan, Tokyo, Japan
Dr. Sanjay Sondhi, TITLI TRUST, Kalpavriksh, Dehradun, India
Dr. Nguyen Thi Phuong Lien, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Dr. Nitin Kulkarni, Tropical Research Institute, Jabalpur, India
Dr. Robin Wen Jiang Ngiam, National Parks Board, Singapore
Dr. Lionel Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. Wolfe, Antioch, California, USA
Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
Dr. V.P. Uniyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

Dr. Neelesh Dahanukar, IISER, Pune, Maharashtra, India
Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dubai, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekhar U. Rivonker, Goa University, Taleigao Plateau, Goa. India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Mr. H. Byju, Coimbatore, Tamil Nadu, India
Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
Dr. J.W. Duckworth, IUCN SSC, Bath, UK
Dr. Rajah Jayapal, SACON, Coimbatore, Tamil Nadu, India
Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
Mr. J. Praveen, Bengaluru, India
Dr. C. Srinivasulu, Osmania University, Hyderabad, India
Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
Dr. Gombobaatar Sunde, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
Dr. Simon Dowell, Science Director, Chester Zoo, UK
Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. P.A. Azeez, Coimbatore, Tamil Nadu, India

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
Dr. Anwaruddin Chowdhury, Guwahati, India
Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SACON, Coimbatore, Tamil Nadu, India
Dr. Angie Appel, Wild Cat Network, Germany
Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
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Dr. Dan Challender, University of Kent, Canterbury, UK
Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
Prof. Karan Bahadur Shah, Budhanilakantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

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ravi@threatenedtaxa.org

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