Powdery Mildew Fungi of Dendroflora of Southern Uzbekistan (Surkhandarya Region)

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Abstract: The article presents data on Powdery mildew of trees and shrubs of the Surkhandarya region of Uzbekistan. 11 species of Powdery mildew fungi were found on trees and shrubs of this region. They belong to 2 classes (Leotiomycetes, Lecanoromycetes), 2 orders (Erysiphales, Lecanorales), 2 family (Erysiphaceae, Heterodeaceae) and 5 genera (Microsphaera, Phyllactinia, Sphaerotheca, Trichocladiad, Uncinula). Two species of Powdery mildew fungi, Sphaerotheca pannosa var. rosae Woron. on Rosa ecae Aitch. and Trichocladiad coluteae f. coluteae Jacz. on Colutea orbiculata (Sumnev.) Yakovlev, have been recorded on the territory of Uzbekistan for the first time, and new host plants of these parasite fungi were identified.

Keywords: Powdery mildew, Ascomycetes, chasmothecia, asci, ascospores, mycelium, conidia

1. Introduction

Surkhandarya region is located in the south of Uzbekistan with area is 2 009 900 hectares. The region has a plain part (Amudarya, Surkhandarya and Sherabaddarya river valleys) and a mountain part which includes southern slope of the Hissar ridge, the Baysun mountains, Kuhitang and Babatag ridges (Ergashev, 1974).

Powdery mildew fungi belong to the class of marsupials - Ascomycetes. This is the group of exophytic obligate parasites of the vascular plants. Powdery mildew fungi are widely spread around the world, but they are unevenly allocated. Most of them are distributed in the temperate zone. The season of emerging of fungi is confined to the half of the summer. It is easy to detect them by the white powdery coating on vegetative organs of many cultivated and wild grasses, trees and shrubs (Vasjagina et al. 1961).

The first data on mycobiota of the Surkhandarya region can be found in the work of P.N. Golovin, who mentioned 7 species of imperfect fungi (Golovin 1949).

In 1984-1987, 61 species of Powdery mildew fungi were detected on the vascular plants of Surkhondarya region by Y.S. Solieva, 10 of them were found on trees and shrubs [2].

2. Materials and Methods

Our research is based on herbarium specimens of infected plants collected in 2015 on the territory of Surkhandarya region. Also we have studied herbarium materials from this area stored in TASH. The field work was carried out with the usual method of collection and herbarisation of plants affected by fungi (Pavlova et al. 2014). Determination of fungi was carried out “in vitro” by examination of diseased parts of plants using microscope. Receiving parts of collected specimens were necessary only in certain cases. We removed surface covered with chasmothecia from the plant, placed it into 50% lactic acid solution, warmed up to get in the expanded form all the parts and organs, and then studied the specimen by microscope. For calculating the number of asci in chasmothecia and ascospores in asci, fruit bodies should be slightly pressed with the needle * on the cover glass (Golovin 1949). We used published identification guides and monographs for Powdery mildew fungi identification (Vasjagina et al 1961; Gaponenko et al 1983). Names of fungi species and their systematic position are given according to Mycobank (http://www.mycobank.org) and "Dictionary of fungi Ainsworth and Bisby" (Kirk et.al, 2008).

3. Results and Discussion

We studied the herbarium materials of trees and shrubs collected from the Surkhandarya region and identified 11 species of Powdery mildew fungi belonging to 2 classes, 2 orders, 2 family and 5 genera (Table 1).

<table>
<thead>
<tr>
<th>Order</th>
<th>Class</th>
<th>Family</th>
<th>Genus</th>
<th>Species</th>
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<td>Microsphaera</td>
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<td></td>
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<td>Phyllactinia</td>
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<td></td>
<td>Sphaerotheca Uncinula</td>
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</tr>
<tr>
<td>Lecanoromycetes</td>
<td>Lecanorales</td>
<td>Heterodeaceae</td>
<td>Trichocladiad</td>
<td>5</td>
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</tbody>
</table>

Microsphaera Leveille

1. Microsphaera lonicerae (DC.) G. Winter, Rabenhorst's Kryptogamen-Flora, Pilze - Ascomyceten 1(2): 36 (1884) [MB#120808]. Cobweb mycelium, mainly on the upper side of the leaf, blurry or with spots. Conidia are cylindrical or ellipsoidal, single, 30-41x11-14 µm. chasmothecia are scattered or in clusters, dark-brown, 60 -100 µm in diameter.
with polyhedral cells of peridium 8-17 µm in diameter. Appendages are equatorial, groove, 5-22, sometimes bigger, straight, colorless or slightly brown at the base, 80-300 mm long. 3-5 - a multiple dichotomously branched, with spreading not thickened branches, which are curved or straight. Ascii 2-7, wide-ellipsoidal or almost spherical, with a mild foot or without, 39-56x28-48 µm. Ascospores 4-6, ellipsoidal, 14-24 x 8-14 µm.

Host plants and their locations. On leaves of Lonicera nummularifolia Jaub. Surkhandarya region, Kuhting ridge, Machaylisoy valley, (alt. 1900 m a.s.l., 09.07.1986), Baysun forestry farm, Machaylisoy valley, (alt. 1600 m a.s.l., 11.08.2015).


Host plants and their locations. On the leaves of Berberis sp. Surkhandarya region, Mechetly ridge, Zinchob village (alt. 2200 m a.s.l., 20.06. 1987). Baysun forestry, Machaylisoy valley, Gurbulak tract, (alt. 1600 m a.s.l., 11.08.2015).

Phyllactinia Leveille

3. Phyllactinia fraxini (DC.) Homma, Journal of the Faculty of Agriculture of the Hokkaido Imperial University 38: 409 (1937) [MB#265323]. Mycelium on the underside of the leaf, quickly disappearing. Conidia are clavate. Chasmotheca are scattered on the underside of the leaf, spherical, 204-240 µm in diameter. Appendages are colorless, without partitions, awl-shaped, pointed, length 295-340 mm, at the bottom of the inflated globular. Ascii are numerous, widely ovate-ellipsoidal, 77-88x32-41 µm. Ascospores 3, ovate, 28-35 x 19-22 µm.

Host plants and their locations. On the leaves of Fraxinus sogdiana Surkhandarya region, Baysun forestry, Machayli valley (alt. 1400 m a.s.l., 11.08. 2015). Note. It should be noted that the parasite strongly affects plants especially young.

4. Phyllactinia suffulta f. moricola Jacz., Karmanny opredelitelʹ gribov. II. Muchnistro-rosjanye griby 434 (1927) [MB#279492]. Mycelium on the underside of leaves, disappearing. Conidia are colorless, widely-clavate, 65.1-71.3-71.3x15.5-18.6 µm. Chasmotheca are scattered or in separate groups, 226-249,6 µm in diameter. Appendages located equatorially, swollen spherically at the base, without walls, pointed at the end, 160-380 µm in length. Ascii numerous, oblong-ellipsoid, 71.3-80.8 x 24.8 - 34.1 µm. Number of ascospores 2, ellipsoidial.

Host plants and their locations. On the leaf of Pistacia vera L. Surkhandarya region, Kugitang ridge, 12.06.1985.

6. Phyllactinia suffulta f. populi Jacz., Karmanny opredelitelʹ gribov. II. Muchnistro-rosjanye griby 439 (1927) [MB#279493]. Disappearing mycelium on both sides of the leaf. Conidia broadly-clavate, 65.5-72x17-22 µm. Chasmotheca scattered on both sides, more on the lower side, 178-249 µm in diameter. Ascii are numerous, saccular, 69-87x30-34.5 µm on the foot. Ascospores number 2, ellipsoidial, 34.5-41x19-25 µm.

Host plants and their locations. On the leaves of Populus afganica (Aitch.et Hemsl.) Schneid. Surhandarya region, Machay village, Kugitang ridge, (alt. 1400 m a.s.l., 11.08.2015). Note. On the territory of Surkhandarya region, Phyllactinia suffulta f. populi was detected on the Populus afganica for the first time.

Sphaerotheca Leveille

7. Sphaerotheca pannosa var. rosae Woron.: 450 (1914) [MB#138397] (Fig. 2). The mycelium is abundant, initially white, cobweb, and then sealing up of felt or membranous, becoming gray or brown. Chasmotheca are in mycelium plexus, dark brown, 76.8-89.6 µm in diameter. Ascii are ellipsoidial, 20-3-30x12-17.5 µm.

Host plants and their locations. On the leaves, fruits and branches of Rosa marucandica Bunge and Rosa ecae Aitch. Surhandarya, Sherebad district, village Kampritpea (height 600 700 m a.s.l., 10.07.1987 city), Baysun district, Machaylisoy valley (height 1400 – 2000 m a.s.l., 11.08. 2015). Note. This species was found for the first time on Rosa ecae in Uzbekistan, which marked as a new host plant.

Figure 2: Sphaerotheca pannosa f. rosae on Rosa ecae

8. Sphaerotheca pannosa var. persicae Woron., Trudy Byuro po Prikladnoy Botanik 7 (7): 749 (1914)
Mycelium first cobweb, and then sealing up the felt. Conidia is barrel-shaped 16-25 µm. Chasmothecia spherical 64-78 µm. Asci are ellipsoida, 75-100 x 55-75 µm. Ascospores are 8 in the asci, ellipsoidal, 21-24 x 11-18 µm.

Host plants and their locations. On the leaves and sprigs of Amygdalus busharica Korsh. Surkhandarya region, Sherabad district, Kugitang ridge, Kampyr-Tepa village, (alt. 800 - 900 m asl, 07.04.1986; alt. 1600 m a.s.l., 11.08.2015). Baysun district, Baysun forestry farm, Omohonla resort (alt. 1300 -1600 m a.s.l., 13.08.2015).

Trichocladia Neger

9. Trichocladia atraphaxidis Golovin (1950) [MB#286369]. White mycelium is abundant, covering both sides of the leaf in some areas is roughly cobweb. Conidia are elongate-ellipsoidal, 29-44x7-21 µm. Chasmothecia are spherical, dark brown, numerous, 108-166,5 µm in diameter. Asci numbers 8-10, ellipsoidal or almost spherical, on the feet, 55,5-87x29-41 µm. Ascispores 3-4 in the asci, ellipsoidal, 20,5-29x12-14,8 µm.

Host plants and their locations. On the leaves of Atraphaxis sp. Surkhandarya region, Mechitli ridge, Zavareh village (alt. 1500 m a.s.l., 22.06.1987). On the leaves of Atraphaxis pyrifolia Bunge., Baysun forestry farm, Machaylisay valley (alt. 1600 m a.s.l., 11.08.2015).

10. Trichocladia colutae f. colutaeae, Karmannyi opredelitel' gribov. II. Muchnisto-rosjanye griby: 310 (1927) [MB#505400] ((Figure 4). Mycelium is bright yellow, flocculent. Conidia is cylindrical, 30-49x11-16,5 µm. Chasmothecia are 100-170 µm in diameter, with long, flexible, simple or weakly branched appendages. Bags in Chasmothecia are about 6-23, ovate, 52-65x30-35 µm. Spores ellipsoidal, 4-5 in the asci.

Host plants and their locations. On both sides of leaves of Colutea orbiculata (Sumnev) Yakovlev, Baysun forestry farm, the Etimtag tract, (alt. 1500 m a.s.l., 11.08.2015) (Fig. 4).

Note. Trichocladia colutae f. colutaeae was firstly recorded on the territory of Surkhandarya region, and the defeat of Colutea orbiculata by this parasite species was detected for the first time in Uzbekistan.

Uncinula Leveille

11. Uncinula aceris (DC.) Sacc., Sylloge Fungorum 1: 8 (1882) [MB#157622]. Mycelium is cobweb disappearing. Conidia ellipsoidal, 23-30x10-16 µm. Chasmothecia are scattered on the underside of leaves, spherical. Asci numbers 5-12, ovate. Ascospores in the asci is 8, ellipsoidal, 17.5 - 28,5 x 12,2 µm.

Host plants and their locations. On leaves of Acer turkestanicum Pax. The southern slope of the Hissar ridge, the middle mountain belt (alt. 1700 m a.s.l., 14.06.1987).

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References