



Poorly known *Kabatia* species causing leaf spots disease on honeysuckle in Kazakhstan

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Abstract

Three poorly known species of the *Kabatia* were found in Kazakhstan. Symptoms of disease on living leaves of various species of honeysuckle are the similar for all species of *Kabatia*. *Kabatia persica* is typical for the southern regions of Kazakhstan, *Kabatia periclymeni* – for the south-east. The distribution area of *Kabatia mirabilis* is wider, the species is found in the eastern (Altai) and south-eastern (Trans-Ili Alatau) regions.

Key words – conidium – conidiomata – lesion – *Lonicera* – typical symptoms

Introduction

Wild species of honeysuckle is an exclusively valuable food. Currently, many cultivars of edible honeysuckle have already been produced. There are 22 species of the genus *Lonicera* with two endemics (Baytenov 2001) in Kazakhstan. *Lonicera altaica* Pall., so-called "barbarika", is especially promising for the creation of new cultivars. The fruits of this species are oval or ovate, black-blue or bluish due to wax coating, ripen in July-August, and are edible in fresh and dried form, used to make jelly, jam, and juice and as a medicinal product.

On the honeysuckle species growing in Kazakhstan, black leaf spotting, leaf spotting, powdery mildew and rust are noted. Black leaf spots are caused by *Melasmia loniceræ* Jacz. and *Lasiobotrys loniceræ* (Fr.) Kunze. *Puccinia festuca* Plowr. and *P. longirostris* Kom. are noted as causative agents of rust, *Microsphaera magnusii* S. Blumer and *M. loniceræ* G. Winter var. *ehrenbergii* U. Braun – as causative agents of powdery mildew. Leaf spots are caused by species of the coelomycetous genus *Kabatia*.

There are ten species of the genus *Kabatia* worldwide (*Kabatia cucubali* Buchalo, *K. fragariae* Solheim, *K. latemarensis* Bubák, *K. loniceræ* (Harkn.) Höhn., *K. valpellenensis* (Traverso) JC Krug, *K. silenæ* Lobik, *K. naviculispota* TM Achundov & Melnik, *K. periclymeni* (Desm.) M. Morelet, *K. persica* (Petr.) Sutton, *K. mirabilis* Bubák), which also parasitize *Cucubalus*, strawberry, *Silene* and various species of honeysuckle.

After checking the relevant literature (Kalymbetov 1969, Byzova et al. 1970, Sutton 1980, Mel'nik 1997). we concluded that the species of *Kabatia* are poorly known in Kazakhstan, therefore, the purpose of the proposed paper is to describe the species and indicate their distribution.

Materials & Methods

The study was carried out in some regions of Kazakhstan (between 2010–2016). Species of *Kabatia* were found in the eastern, southeastern and southern Kazakhstan (Fig. 1, asterisks).



Fig 1 – Map of Kazakhstan showing the localities of *Kabatia* species

Leaves of plants with typical symptoms were collected during field trips. A Canon 600E camera was used for photographing of typical leaf symptoms. Conidiomata were stripped off the leaf surface, placed in a drop of distilled water on a microscope slide without any staining, examined and photographed using a photomicroscope Polyvar with Nomarski interference contrast optics. Thirty measurements of conidia were made, with the extremes given in parentheses.

Dried specimens are stored in the herbarium of the Institute of Botany and Phytointroduction, Almaty, Kazakhstan (AA).

Results

Symptoms of disease are the similar for all species of the genus *Kabatia* found in Kazakhstan. The lesions on the living leaves are single, rare, mostly small (1–3 mm), occasionally large, angular or irregular (Figs. 2–5), light, whitish, yellowish-brown or ocher, sometimes with a dark brown border. Rare dark dots are noticeable under the magnification on spots (from the upper side of the leaf blade) (Figs. 6–8).

Three species of *Kabatia* differ morphologically (conidiomata and conidia shape, size and morphology).

The short descriptions of *Kabatia* species found in Kazakhstan are given below.

Kabatia mirabilis Bubák, Öst. bot. Z. **55**: 241, 1905

Kabatia mirabilis Bubák var. *mirabilis*, Öst. bot. Z. **55**: 241, 1905

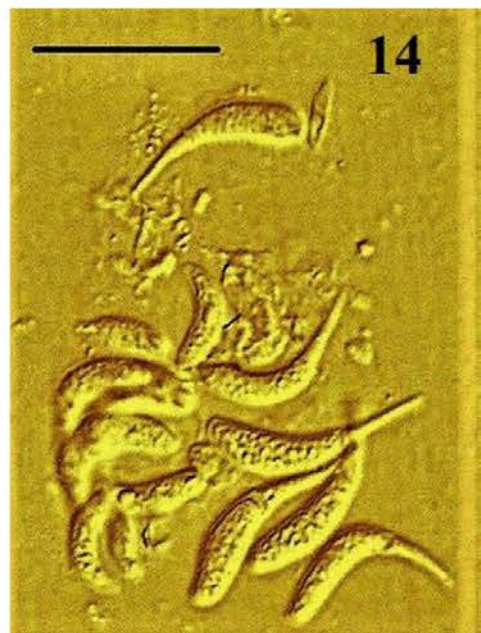
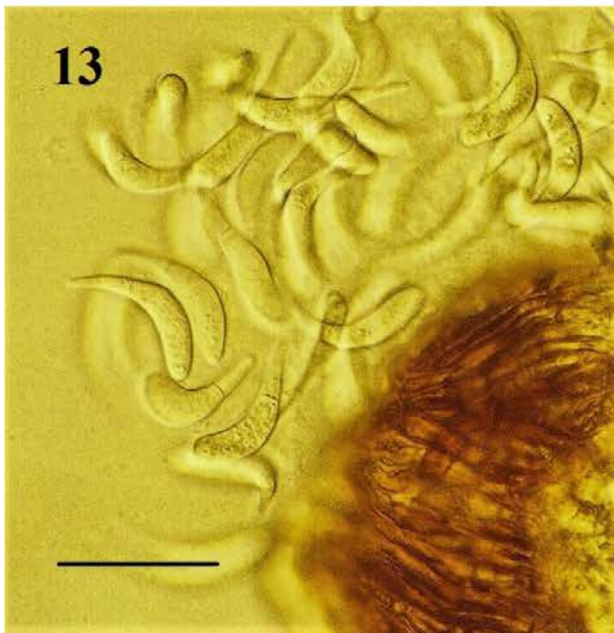
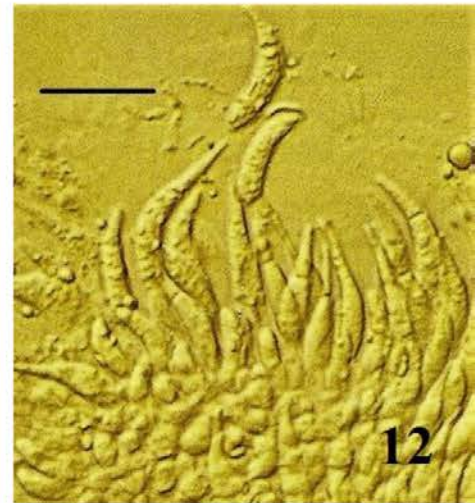
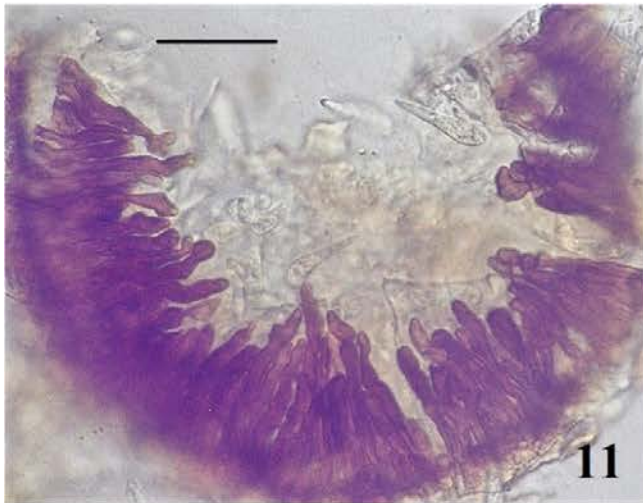
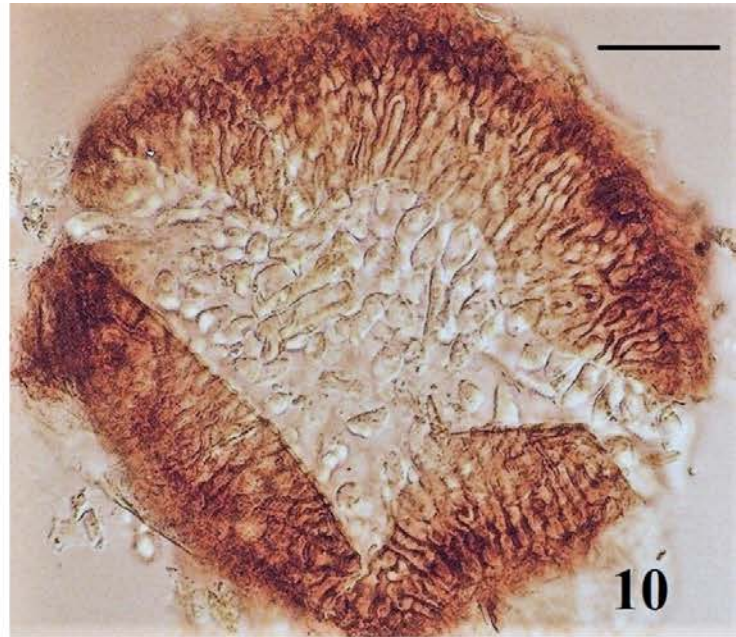
Description – Conidiomata are flat with an outer wall consisting of characteristic cells that converge towards the apex (Fig. 9). Later conidiomata open by rupture of the upper part (Figs 10, 11). Conidia colourless, half moon-shaped, with a wedge-shaped upper end (Figs 12–14), 27.0–43.0 × 6.5–11.5 µm, unicellular or with 1 (2) septum at a distance of 8.0–18.0 µm from the apical point of conidia.



Figs 2–5 – The *Kabatia* lesions on the living leaves of *Lonicera*, 2 – *Kabatia persica* on *Lonicera nummulariifolia*, 3, 5 – *Kabatia mirabilis* on *Lonicera stenantha*, 4 – *Kabatia mirabilis* on *Lonicera tatarica*.



Figs 6–8 – The *Kabatia* spots with sporulation on the upper leaf surface of *Lonicera*, 6, 7– *Kabatia mirabilis* on *Lonicera stenantha*, 8 – *Kabatia mirabilis* on *Lonicera tatarica*.



Figs 9–14 – *Kabatia mirabilis*, 9 – fragment of conidiomata. – Bar = 20 μ m, 10, 11 – rupture of conidiomata, 12 – young conidia, 13, 14 – conidia. – Bars = 30 μ m.

Known distribution – on *Lonicera hispida* Pall. ex Schult., Kyrgyzstan, on *L. karelinii* Bunge ex P. Kir., Uzbekistan (Mel'nik 1997), on *L. microphylla* Wild. ex Schult., Canada (Sutton 1980), on *L. orientalis* Lam., Caucasus (Dagestan), on *Lonicera* sp., Eastern Siberia (Buryatia) (Mel'nik 1997).

Material examined – Kazakhstan, East Kazakhstan region, Altai mountains, Katon-Karagai National Park, Rakhmanovskiye springs, helipad, high. 1795 m above sea level, 49°32'14.9" N, 86°29'35.9" E, on *Lonicera altaica* Pall., 24 July 2014, G.A. Nam; Rakhmanovskiye springs, high. 1803 m above sea level, 49°32'20.1" N, 86°29'36.4" E, on *Lonicera altaica* Pall., 23 July 2014, U.K. Jetigenova; Almaty region, Malai-Sary ridge, the gorge to the north-west from the Tary station, high. 1286 m above sea level, 44°20'43.2" N, 77°45'14.9" E, on *Lonicera tatarica* L., 1 May 2016, E.V. Rakhimova; the northern macroslope of Malai-Sary ridge, the gorge to the south from the Shiilisu village, high. 1241 m above sea level, 44°21'38.3" N, 77°45'22.7" E, on *Lonicera tatarica* L., 21 July 2016, E.V. Rakhimova; the gorge to the south from the Karagash village, high. 1207 m above sea level, 44°21'41.3" N, 77°39'35.3" E, on *Lonicera tatarica* L., 22 July 2016, E.V. Rakhimova; Almaty region, Trans-Ili Alatau ridge, Issyk gorge, the forest above Issyk lake, high. 1761 m above sea level, 43°14'43.1" N, 77°28'35.7" E, on *Lonicera stenantha* Pojark., 14 July 2015, E.V. Rakhimova (AA-186aF).

Kabatia periclymeni (Desm.) M. Morelet, Ann. Soc. Sci. Nat. Arch. Toulon et du Var 31, (no. 212): 9, 1975

- *Colletotrichella periclymeni* (Desm.) Höhn., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 125(1-2): 99, 1916

- *Kabatia periclymeni* var. *xylostei* (Pass.) B. Sutton, The Coelomycetes (Kew): 168, 1980

- *Kabatia periclymeni* var. *periclymeni* (Desm.) M. Morelet, Ann. Soc. Sci. Nat. Arch. Toulon et du Var 31(no. 212): 9, 1975

- *Labrella periclymeni* Desm., Annls Sci. Nat., Bot., sér. 3 10: 358, 1848

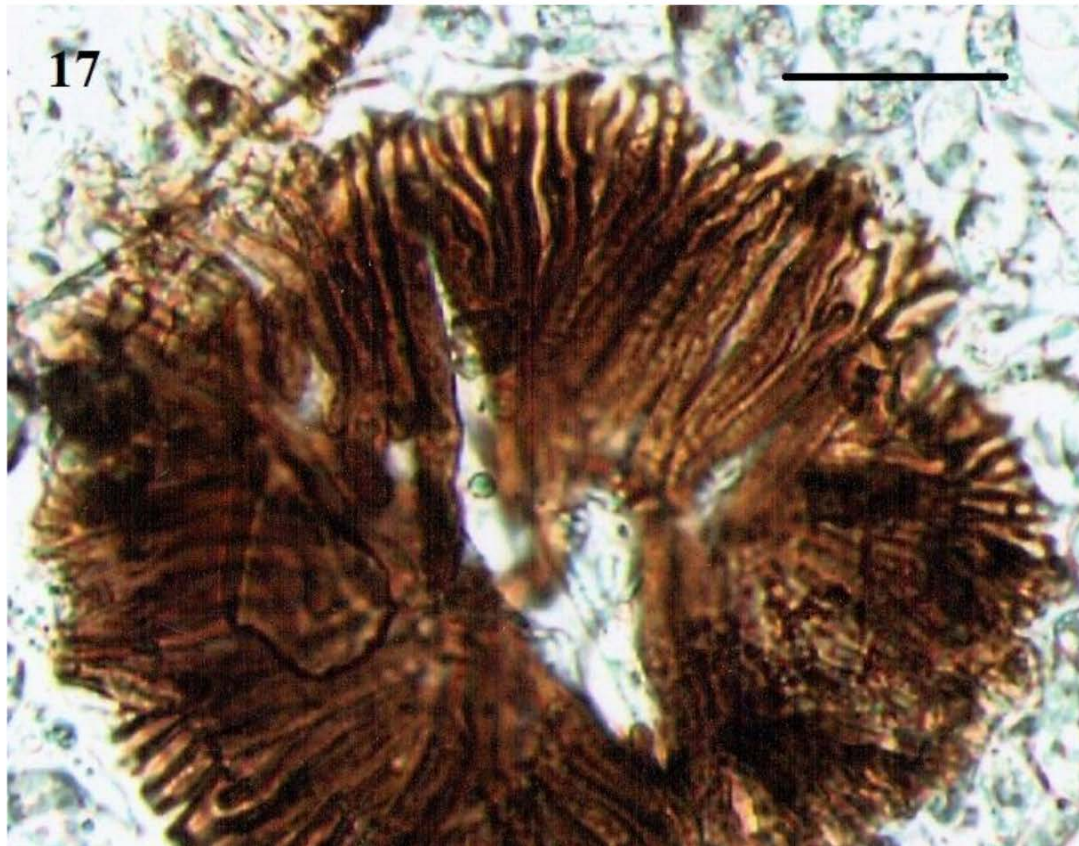
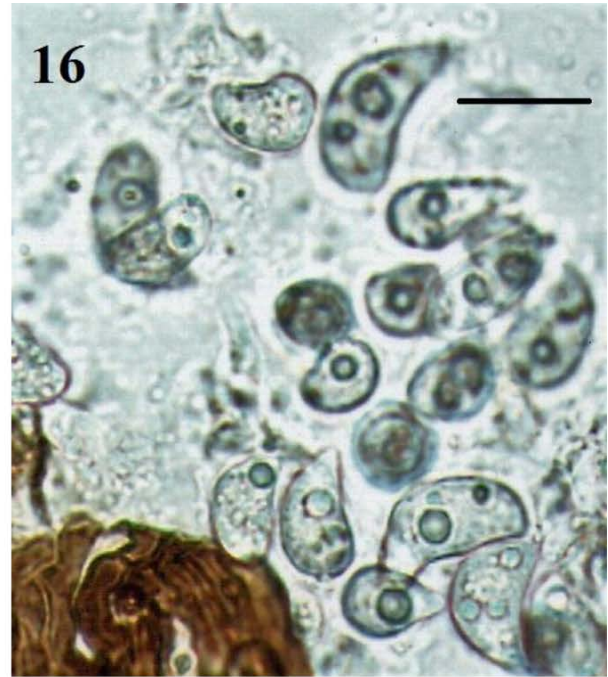
- *Leptothyrium periclymeni* (Desm.) Sacc., Syll. fung. (Abellini) 3: 626, 1884

- *Pseudogloeosporium periclymeni* (Sacc.) Jacz., Opred. Gribov, 2: 38, 1917

Description – Conidiomata single, flat, subcuticular, with a diameter 118.0–159.0 µm. The cells of the upper wall are brown (Fig. 15), thick-walled, mostly straight, sometimes curved, oriented toward the center of the conidiomata. The diameter of the hyphae on the periphery is up to 3.5 µm, decreases towards the center. Conidiomata are opened by radial ruptures between the hyphae of the upper wall (Fig. 17). Conidiophores short, cylindrical. Conidia oblong, semilunar or sickle, strongly bent, rounded at one end, on the other - pointed, unicellular, colorless, with granular contents or drops of oil (Fig. 16), 19.0–33.0 × 6.5–12.0 µm.

Known distribution – on *Lonicera caprifolium* L., Caucasus (Dagestan, Georgia), on *Lonicera xylosteum* L., Europe, Caucasus (Dagestan), Western Siberia (Mel'nik 1997).

Material examined – Kazakhstan, East Kazakhstan region, Altai mountains, Southern Altai ridge, on the way from Chindagatui village to Argaty, on *Lonicera altaica* Pall., 2 Aug 1986, S.M. Lopukhova; Almaty region, Trans-Ili Alatau ridge, Kaskelen gorge, 5 km above the eco-post, at the base of the slope, high. 1313 m above sea level, 43°06'23.8" N, 76°36'35.6" E, on *Lonicera* sp., 7 July 2010, E.V. Rakhimova; Aksai gorge, high. 1754 m above sea level, 43°05'61.5" N, 76°56'38.1" E, on *Lonicera* sp., 14 July 2011, E.V. Rakhimova; South Kazakhstan region, Karatau ridge, Karatau reserve, ym. Kishi-Karakus gorge, high. 920 m above sea level, 43°51'30.2" N, 68°32'24.5" E, on *Lonicera nummulariifolia* Joub. & Spach, 22 May 2013, E.V. Rakhimova (AA-186aF).



Figs 15–17 – *Kabatia periclymeni*, 15 – fragment of conidiomata, 16 – conidia. – Bars = 30 μ m, 17 – rupture of conidiomata. – Bar = 25 μ m.

Kabatia persica (Petr.) B. Sutton, The (Kew): 169, 1980

≡ *Colletotrichella persica* Petr., Annln K. K. naturh. Hofmus. Wien 50: 483, 1940

Description – Conidiomata dark-colored, scattered, solitary, flat, subcuticular, round or elliptical in outline, 92.0–121.5 μ m in diameter, on both sides of the host leaf, but more often on the upper. The cells of the hyphae of the upper wall are brown, thick-walled, straight, centered on the conidiomata,

which opens with radial tears between the hyphae into several irregular lobes. Conidiophores short, cylindrical. Conidia cylindrical, straight, unicellular, colorless, with granular contents (Fig. 18), $14.0\text{--}18.5 \times 6.5\text{--}9.0 \mu\text{m}$.



Fig 18 – *Kabatia persica*, fragment of conidiomata and conidia. – Bar = 20 μm .

Known distribution – on *Lonicera sp.*, Иран, Central Kopetdag (border with Turkmenistan) (Mel'nik 1997).

Material examined – Kazakhstan, South Kazakhstan region, Karatau ridge, Karatau reserve, ущ. Kishi-Karakus gorge, natural boundary Tesik-Tas, high. 917 m above sea level, $43^{\circ}51'38.4''$ N, $68^{\circ}32'24.8''$ E, on *Lonicera nummulariifolia* Jaub. & Spach., 22 May 2013, E.V. Rakhimova; The western part of Kyrgyz Alatau ridge, a dry gorge east of Taraz, a slope of the western exposition, high. 1023 m above sea level, $42^{\circ}53'47.6''$ N, $71^{\circ}35'96.1''$ E, on *Lonicera sp.*, 2 Aug 2013, B.E. Dzhunuskanova (AA-186aF).

Discussion

Findings of rare species are of taxonomic interest, since species diagnoses are inevitably refined, and species distribution areas are being expanded. According to the literary data (Mel'nik 1997), seven out of ten species of the *Kabatia* are rare for the territory of Russia. As for Kazakhstan, the species *Kabatia periclymeni* was first observed in the Trans-Ili Alatau (Kalymbetov 1969, Rakhimova & Nam 2013) and in northern Kazakhstan (Byzova et al. 1970). *Kabatia persica* was first discovered in 2013, during the mycological survey of the Karatau ridges and the Kyrgyz Alatau (Assylbek & Rakhimova 2014). In 2014, when processing the herbarium collected in the Altai, *Kabatia mirabilis* was first discovered (Rakhimova et al. 2016). *Kabatia persica* is common in the southern regions of Kazakhstan, *Kabatia periclymeni* – for the south-east. The distribution area of *Kabatia mirabilis* is wider, the species is found in the eastern (Altai) and south-eastern (Trans-Ili Alatau) regions.

As for the adjacent territories, the genus *Kabatia* and its species *K. mirabilis* on living leaves of *Lonicera caucasica* is mentioned for Turkey as a new record (Hüseyin & Selcuk 2001).

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