
Fungal diseases of *Hypericum perforatum* L. and *H. maculatum* Crantz. in Lithuania

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Data on the diversity of fungal diseases of *Hypericum perforatum* and *H. maculatum* in Lithuania. The study was carried out by collecting the specimens in the field and employing the literature survey. The most frequent diseases in natural habitats were leaf spotting caused by *Passalora hyperici* and leaf blight caused by *Diploceras hypericinum*. These fungi were detected on *H. maculatum* for the first time in Lithuania. Root and stem rot caused by a *Fusarium–Verticillium* complex was detected in the field collection of Medicinal and Aromatic Plants of the Institute of Botany. We plan to continue the investigation of disease resistance and expect to find means to control and prevent most dangerous diseases of *Hypericum* in Lithuania.

Keywords: medicinal plants, *Hypericum*, leaf spotting, leaf blight, root rot, disease resistance

INTRODUCTION

The growing demand for medicinal and aromatic plants is satisfied by collecting them from wild and increasing their cultivation. In modern phytotherapy, attention to *Hypericum* is increasing. On the world scale, *H. perforatum* L. is the best known as a natural antidepressant [1, 2]. To provide a homogeneous highly productive and disease-resistant plant material, the breeding work has been started in many countries of Europe, Lithuania included. Only one Russian cultivar 'Zolotodolinskaja' has been known so far in Lithuania. According to the previous data, *H. perforatum* exhibits a wide range of its morphological and productivity characters [3]. It can be expected that wild populations of *Hypericum* are a potentially important source of genetic variation for improvement of the cultivated material.

This study is part of a broader framework for the examination and selection of the *Hypericum*. It is the first attempt to examine the diversity of fungal diseases in wild and cultivated accessions of *Hypericum* in Lithuania. The resistance to phytopathogens of medicinal plants is highly important as the application of pesticides is hardly accepted.

MATERIALS AND METHODS

The herbarium specimens of the overground part of diseased plants of *H. perforatum* L. and *H. maculatum* Crantz. were collected in natural habitats

during field trips in 1998–1999. All specimens are deposited in the herbarium of the Institute of Botany (BILAS). The accessions from the field collection of Medicinal and Aromatic Plants (MAP) of the Institute of Botany were tested for phytopathogens in 1998–2000. The collection number marks the accessions. The phytopathogenic fungi were isolated from surface-sterilized [diseased] roots of *Hypericum* spp. into malt extract agar (MEA) containing 0.075 g/l of streptomycin [4]. Disease agents were identified basing on several books and guides of plant diseases [5–11]. The genus *Fusarium* Link: Fr. is classified according to the V. J. Bilai system [5, 12]. Severity of diseases was ascertained following J. M. Waller et al. [4].

RESULTS AND DISCUSSION

Powdery mildew

Symptoms – white mycelium on stems and leaves of plants. Cylindrical or ellipsoid conidia in short chain or single, $19.04 \times 11.2 \mu\text{m}$ – *Erysiphe hyperici* (Wallr.) ex S. Blumer.

Distribution. On *H. perforatum* leaves and stems (Kėdainiai, Plungė, Ignalina, Rokiškis, Neringa districts) very frequent, on *H. maculatum* (Alytus, Raseiniai, Pakruojis, Šalčininkai) frequent [8], Švenčionys distr., Pabradė, $54^{\circ}58'56.7''$ N $025^{\circ}53'18.0''$ E, July 10, 1998.

Leaf-spotting

Symptoms – leaf spots mostly angular, 3–5 mm in diameter, dark brown, without distinct border, fruiting hypophyllous, stromata – a few large brown cells of conidiophores, often with swollen base, rarely septate, not geniculate, not branched, small spore scar at rounded tip, conidia obclavate to obclavato-cylindrical, rounded or obconic base, blunt tip, 0–4 septate, straight, $1.85 \times 25.73 \mu\text{m}$. – *Passalora hyperici* (Tehon & E. Y. Daniels) U. Braun.

Distribution. On *H. perforatum* leaves – Varėna, (1992), Molėtai (1994), Švenčionys (1994), Rokiškis (1995) districts [13, 14], Anykščiai distr., Čekonys, $55^{\circ}34'44.5''$ N $025^{\circ}12'18.1''$ E, July 15, 1998; Anykščiai distr., Svėdasai, July 15, 1998; Alytus distr., August 26, 1999 (Leg. V. Markevičius); Molėtai distr., Joniškis, $55^{\circ}05'12.5''$ N $025^{\circ}41'19.6''$ E, July 1, 1998; Molėtai distr., Joniškis, $55^{\circ}04'52.4''$ N $025^{\circ}40'37.5''$ E, July 1, 1998; Ukmergė distr., July 15, 1998, on *H. maculatum* leaves – Anykščiai distr., Pavirinčiai, $55^{\circ}26'09.2''$ N $025^{\circ}03'32.9''$ E, July 15, 1998; Molėtai distr., Labanoras, July 2, 1998.

Leaf blight and stem dieback

Symptoms – yellowing leaves and stem dieback. Lower leaves of plants showed marginal necrosis or circular, expanding, uniformly brown, unremarkable leaf lesions. Single acervuli in lesions under epidermium, usually on the upper side of leaf. Conidia cylindrical, a little curved, 3-septae, with two shoots out of ends $15.6 \times 3.7 \mu\text{m}$ – *Diploceras hypericinum* (Cesati) Diedicke (Fig. 1).

Distribution. On *H. perforatum* stems and leaves – Jonava (1995), Rokiškis (1996), Švenčionys (1994), and Vilnius (1993) districts [11], Širvintos distr., Kernavė, $54^{\circ}52'46.0''$ N $024^{\circ}50'47.0''$ E, July 9, 1998; Akmenė distr., Purviai (Leg. Det. V. Markevičius), July 29, 1998; on *H. maculatum* stems and leaves – Ignalina distr., National Park, July 10, 1998; Molėtai distr., Labanoras, $55^{\circ}15'52.5''$ N $025^{\circ}46'08.4''$ E, July 2, 1998.

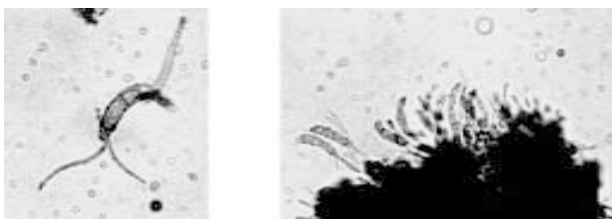


Fig. 1. Conidia of *Diploceras hypericinum* (A – single, B – in acervuli) on *H. maculatum*

Root and stem rot

Root and stem rot caused by the soilborne fungus *Fusarium* may attack plants in any stage of growth. The disease symptoms may appear as yellowed plants, and more of the overground symptoms are difficult to notice. Often in cool and rainy weather white mycelium on the hypocotyl and primary root of diseased plants may appear. *Fusarium* has a wide host range. It may act alone and more often is association with other soilborne pathogenic fungi, such as *Rhizoctonia* or *Phytium*. The complex of *Fusarium*–*Verticillium* has been identified in the field collection of MAP.

Distribution. In natural habitats root and stem rot has not been detected.

Considerable losses in yield and quality of raw material are caused by pathogens. In the USA *Diploceras hypericinum* causes most damage to *H. perforatum*. This fungus was for the first time detected in the United States in 1999 [15]. On the other hand, in Europe a dangerous pathogen to *H. perforatum* plantations is *Colletotrichum gloeosporioides* [16, 17]. *Colletotrichum gloeosporioides* parasitizing *Hypericum* has not been found yet in Lithuania, and *Diploceras hypericinum* was found in many habitats of *Hypericum*. An other phytopathogenic fungus rather frequent on *Hypericum* is *Passalora hyperici*. For the first time in Lithuania the new host (*H. maculatum*) for both fungal species was ascertained and new localities detected (Fig. 2).

The monitoring of phytosanitary conditions in the field collection of MAP identified differences among accessions of *Hypericum* considering pathogens. The slight distribution (about 10%) of root rot was detected

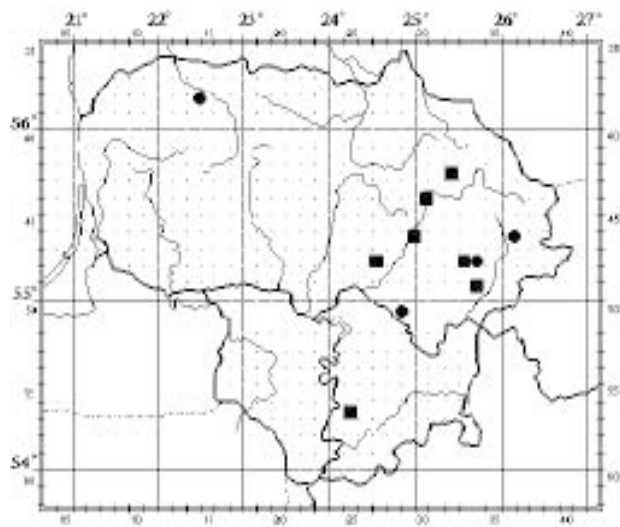


Fig. 2. New localities of *Diploceras hypericinum* (●) and *Passalora hyperici* (■) in Lithuania

ted among 218 and 224 accessions of *H. perforatum* in 1998. The *Fusarium-Verticillium* complex was identified in diseased plants. A higher intensity of root rot was observed in the second and third years of investigation. Most severely (about 50%) the plants were damaged in accessions of *H. perforatum* (218, 219, 379, 381, 383, 384 385). Plants of the cultivar 'Zolotodolinskaja' (278) and accessions of *H. maculatum* (335, 378, 376) were injured up to 80%. Fungi of the genera *Rhizoctonia*, *Penicillium*, *Cladosporium*, *Aspergillus* were identified together with the root rot agents *Fusarium* and *Verticillium*. The weather conditions influence disease severity, but field accessions of *Hypericum* have exhibited different resistance to infection. Therefore in the future we are going to investigate the resistance of different biotypes of *Hypericum* to fungal diseases in glasshouse and in field experiments. We expect to find means of control and prevention of most dangerous diseases in Lithuania.

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HYPERICUM PERFORATUM L. IR H. MACULATUM CRANTZ. GRYBINĖS LIGOS LIETUVOJE

S a n t r a u k a

Straipsnyje pateikti duomenys apie svarbiausius jonažolės (*Hypericum*) grybinių ligų sukėlėjus. Identifikuoti pavojingi šaknų puvinių (*Fusarium* spp. ir *Verticillium* spp.), dėmėtligės (*Passalora hyperici* Tehon & E. Y. Daniels) ir degulių (*Diploceras hypericinum* (Cesati) Diedicke) sukėlėjai. *P. hyperici* ir *D. hypericinum* ant pažeistų *H. maculatum* augalų Lietuvoje identifikuoti pirmą kartą. Aprašyti tipingi ligos požymiai, pateikti originalūs konidijų matmenys bei nurodytos naujos radimvietės.