



## Identification of the causal agent of the field thistle shoot bleaching and its biologically active metabolites

Elizaveta Lukina<sup>1\*</sup>, Maria Gomzhina<sup>2</sup>, Anna Dalinova<sup>2</sup>,  
Vsevolod Dubovik<sup>2</sup> & Alexander Berestetskiy<sup>2</sup>

<sup>1</sup> Department of Botany, St. Petersburg State University, Saint Petersburg, Russia

<sup>2</sup> All-Russian Institute of Plant Protection, Saint Petersburg, Russia

Several fungal strains were isolated from leaves and stems with chlorotic and necrotic lesions of Canada thistle (*Cirsium arvense* (L.) Scop.) collected in Canada. These strains were identified as *Didymella macrostoma* (Mont.) Qian Chen & L. Cai and produced biologically active compounds named macrocidins and macrooxazoles (Graupner et al. 2003; Kemkuignou et al. 2020). Plants demonstrated the similar symptoms were found in Pushkin district of Saint Petersburg, several *Phoma*-like fungi were isolated from these samples. The aim of the study was to assess the prospects of these isolates as producers of biologically active metabolites.

Results of the multi-locus phylogenetic analysis of 4 loci (ITS, LSU,  $\beta$ -tubulin, RPB2) demonstrated that the isolates were identified as *Didymella* sp. to be identical to the Canadian strains of *D. macrostoma*. It is the first record of this fungus in Russia.

Inoculation of Canada thistle seedlings by this fungus led to development of photobleaching symptoms. The fungus was reisolated from chlorotic and asymptomatic plants.

Macrocidins and macrooxazoles were detected in the extracts from culture filtrates of the fungal strains by HPLC-MS. Macrocidins were purified from the obtained extracts, their phytotoxic and antimicrobial activity was confirmed. For the first time, macrocidins showed low insecticidal activity and were non-toxic to *Paramecium caudatum*.

Thus, the studied fungus is a producer of biologically active metabolites. In further work, we plan to study the ecological role of these compounds and assess the prospects of their use in agriculture.

**Acknowledgements.** The authors thank Sergey Smirnov for conducting NMR spectroscopic measurements.

---

\* Presenting author: e-mail: elizaveta121999@mail.ru