

Features of the interaction of the effector genes *ToxA* and *ToxB* with the susceptibility genes *Tsn1* and *Tsc2* in different species of wheat

Mironenko N.^{1*}, Baranova O.¹, Kovalenko N.¹, Mitrofanova O.²

¹All-Russian Institute of Plant Protection, St. Petersburg, Russia

²N.I. Vavilov All-Russian Institute of Plant Genetic Resources (VIR), St. Petersburg, Russia

* e-mail: nina2601mir@mail.ru

The *Triticum aestivum*–*Pyrenophora tritici-repentis* pathosystem is well studied in durum and common wheat. The purpose of our study is to assess the distribution of the sensitivity genes *Tsn1* (5BL) and *Tsc2* (2BL) in species of the genus *Triticum* L. from the VIR collection and the response of wheat accessions containing these genes to infection by isolates with complementary genes effectors *ToxA* and *ToxB*. All 72 accessions of 16 wheat species were evaluated for resistance to two isolates *ToxA*⁺ originating from Kazakhstan and Russia, and one *ToxB*⁺ from Greece. Using gene-specific primers, *Tsn1* and *Tsc2* were not detected in the diploid species *T. urartu*, *T. boeoticum*, and *T. monococcum*. In the wild tetraploid wheats *T. dicoccoides* and *T. araraticum* and six cultivated tetraploid species, the *Tsc2* gene and the polymorphism of the *Tsn1* were detected. In the *T. timopheevii*, only the *Tsc2* gene was identified. Polymorphism for both genes was observed in all hexaploid species (genome *BBAADD*). The manifestation of necrosis and/or chlorosis on wheat leaves is observed when the plant and the pathogen have both of the dominant genes *Tsn/ToxA* and/or *Tsc2/ToxB*, respectively. All diploid wheat species had no susceptibility reactions. The gene-on-gene *Tsc2/ToxB* gene interaction was observed in accessions of *T. aethiopicum* and *T. turgidum*, as well as for most accessions of hexaploid species. All accessions of *T. dicoccoides* and *T. dicoccum*, despite the presence of the *Tsc2* gene, were resistant to the *ToxB*⁺ isolate. The reasons for this resistance are being studied. When evaluating the interaction of the *Tsn1/ToxA*, 11 accessions of different tetra- and hexaploid species of wheat aroused particular interest. The *Tsn1* was not detected in these accessions, but a strong necrosis was observed when infected with *ToxA*⁺ isolate, which is possibly due to the presence of other unknown susceptibility and effector genes.

Acknowledgements: This study was partially supported by the RFBR grant 18-04-00128a.