

ENGLISH VERSION

ZESZYTY 390

The occurrence of fungi from the genus *Fusarium* on oats (*Avena sativa* L.) with special regard to the species *Fusarium avenaceum* (Fr.) Sacc., its biology and harmfulness to selected cultivars

Rozprawy Naukowe UP w Lublinie 390, Lublin 2018, ss. 157

The high importance of fungi from the genus *Fusarium*, including *F. avenaceum*, for cereals, and poor knowledge on the harmfulness of this fungus to oat in our country, as well as the introduction of new cultivars in agricultural practice, were the stimulus to undertake a study aimed: at the determination of the share of fungi from the genus *Fusarium* in infecting different parts of oat plant; estimation of the susceptibility of oat genotypes to *F. avenaceum* infection, taking into account the contamination of kernels with mycotoxins; determination of optimum conditions for the growth and sporulation of selected *F. avenaceum* strains in *in vitro* conditions; determination of the occurrence of mating types *MAT1-1* and *MAT1-2* in the population of *F. avenaceum* and, finally, at obtaining the teleomorph of this species in laboratory conditions.

Multi-year field studies conducted in two regions of Poland, in which a total of 32 oat genotypes were included, indicate a considerable share of fungi from the genus *Fusarium* spp., especially *F. culmorum* and *F. avenaceum*, in infecting the seedlings, roots and the stem base of oats. These species proved also to be the main cause of fusariosis of oat panicles in Poland. In recent years, *F. poae* also plays a significant role in causing this disease. Besides, depending on weather conditions, panicles are colonised, with varying intensity, by *F. sporotrichioides*, *F. equiseti*, *F. crookwellense* and *F. graminearum*, which creates a danger of contamination of oat kernels and its products with metabolites toxic to homothermic organisms.

The harmfulness of *F. avenaceum* as a pathogen causing seedling blight and foot rot is confirmed by results of field and growth chamber studies with pre-sowing grain inoculation with this fungus. A significant correlation between the infection index of the studied oat cultivars in the conditions of the growth chamber and the amount of moniliformin produced indicate a role of this metabolite in the pathogenesis of seedling blight. Significantly the lowest value of the index of infection by the analysed *F. avenaceum* strains justifies regarding Rajtar cv. as the least susceptible to infection by this species under conditions of controlled temperature and humidity.

Inoculation of panicles with *F. avenaceum* at anthesis is the cause of a yield reduction resulting from decreased number of kernels in a panicle and 1000 kernels weight, as well as lowered yield quality due to grain contamination with moniliformin (from 0.010 to 0.870 mg·kg⁻¹) and enniatins (Enn B from 0.406 to 0.985 mg·kg⁻¹, Enn B1 from 0.000 to 1.029 mg·kg⁻¹). In the conditions under study, the kernels yield decrease from panicles inoculated with *F. avenaceum* averaged 38.2%. Adopting the yield decrease and moniliformin content in kernels as the criterion of assessment, cultivars Rajtar, Bingo and Polar proved to be the least susceptible to panicle infection by this pathogen. Cultivar Chwat, which showed considerable susceptibility to *F. avenaceum* infection of both oat panicles and seedlings, seems to be the least recommendable for cultivation.

The obtained results show that in the conditions of *Fusarium* spp. threat the forecrop value of oat in the cereal crop rotation might prove insufficient for a significant improvement of the health status of successive plants, which is why it is proper to cultivate genotypes with low susceptibility to infection by these pathogens. Determination of the degree of resistance of oat cultivars to infection by *Fusarium* spp. and of grain contamination with mycotoxins is valuable information both for breeding and for agricultural practice, allowing proper choice of genotypes for cultivation and achieving high yield quality.

The laboratory study showed that among the three media used, the oats medium (OW), and among the temperature ranges tested, the temperature of 22°C, are the most conducive to the growth and sporulation of *F. avenaceum*.

The results of molecular analyses revealed the occurrence of *MAT1-1* and *MAT1-2* genotypes in the population of *F. avenaceum* isolates obtained from different parts of oat plants, while interbreeding of the complementary mating types *MAT1-1* and *MAT1-2* on the cultured medium made it possible to obtain teleomorphs of this fungus, for the first time both in Poland and in the world.