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Table of Contents

Home

Editorial Board

For Authors

- Authors Declaration
- Instruction to Authors
- Guide for Authors
- Copyright Statement
- Submission

For Reviewers

- Guide for Reviewers
- Reviewers Login

Subscription

Czech J. Genet. Plant Breed.

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Effects of genotype, environment and fungicide treatment on development of Fusarium head blight and accumulation of DON in winter wheat grain

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Reactions to artificial infection with *Fusarium culmorum* and (metconazole- or tebuconazole-based) fungicides were studied in nine winter wheat cultivars that were evaluated in field experiments at the location Prague-Ruzyne for four years (2001−2004) for deoxynivalenol (DON) content in grain, pathogen DNA content

(Ct) by real-time quantitative PCR, percentage of Fusarium damaged grains (FDG), symptom scores and reductions in grain yield components. All examined traits were highly affected by conditions of experimental years and interactions with cultivars and treatments. Moderately resistant cultivars Arina and Petrus were included in the first homogeneous group in all traits, including the pathogen DNA content. To predict cultivar resistance to Fusarium head blight and accumulation of DON, the examination of the percentage of FDG in different environments appeared to be useful from practical aspects. The pathogen DNA content was significantly related to the content of DON under different conditions, however, the correlation coefficients ranged between 0.42 and 0.92. Different levels of DON could be detected at similar pathogen contents. The higher colonization of grain by the fungus was mostly connected with a strongly reduced amount of DON per pathogen unit (DON/Ct ratio). The fungicide treatment had a significant effect on a reduction in all traits except DON/Ct, but the effects on different traits were not often proportional and they were

highly variable in the particular years (range 10−69%) and cultivars (range < 0−60%). While the application of fungicide caused a reduction in DON content in all cultivars, an increase in pathogen content after the application of fungicides was not exceptional. The low fungicide effect on a reduction in pathogen content was connected with higher temperatures (temperature extremes) in a 30-day period of disease development. The efficacy of fungicide treatment for DON was low at high pathogen content and late heading. The use of the collected data to improve control measures is discussed.

Keywords:
i>Fusarium culmorum; deoxynivalenol content; pathogen DNA content; real-time PCR assay; disease severity traits; disease control; cultivar resistance

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