Cent. Eur. J. Biol. • 8(7) • 2013 • 701-711
DOI: 10.2478/s11535-013-0176-3

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Central European Journal of **Biology**

Association of mating-type with mycelium growth rate and genetic variability of *Fusarium culmorum*

Research Article

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Received 12 September 2012; Accepted 10 March 2013

Abstract: Background: Barley is an important crop used widely in Europe for food production, feed and malting. Unfortunately it is often colonised by fungi from the *Fusarium* genus. *Fusarium culmorum* is a global pathogen causing root rot and crown rot in small-grain cereals, resulting in a reduction in yield and grain quality. *F. culmorum* produces the highly toxic chemicals trichothecenes. Experimental Procedures: Chemotypes and mating-type idiomorphs (MAT) were identified using Polymerase Chain Reactions (PCR) and genetic diversity was determined using Sequence-related Amplified Polymorphism (SRAP) and Random Amplified Polymorphic DNA (RAPD). Physiological features such as mycelium growth rate were also evaluated. Results: As many as 94% of isolates was classified as a 3ADON producing and only two isolates displayed NIV chemotype. The average growth rate at 15ºC and 25ºC equalled 5.32 mm/day and 13.5 mm/day, respectively. The *MAT* idiomorph amplification revealed that 60% of isolates possessed *MAT1-2* idiomorph. Among 32 obtained SRAP and RAPD markers, eight were associated with mycelium growth rate. Conclusions: It was shown first time that *F. culmorum* isolates with *MAT1-2* idiomorph in the genome grew slower than these with *MAT1-1*. High level of genetic variability was determined based on amplification of SRAP and RAPD markers.

Keywords: *Barley disease • Chemotype • Fusarium culmorum • Mycelium growth • Mating-type idiomorphs • Mycotoxin • Root rot • SRAP • Tri genes*

1. Introduction

The *Fusarium* genus includes the most important worldwide cereal fungal pathogens. *Fusarium culmorum* (W. G. Smith) Sacc. is a widespread and destructive pathogen causing brown root and foot rot in wheat, barley and rye [1,2]. The disease causes very high yield losses worldwide [3] *Fusarium* root rot affects the root and crown functions, resulting in a loss of stand, reduced yield and lower grain quality. The severity of the disease is affected by environmental factors, such as temperature and humidity, and by some agricultural practices. Infection by the pathogen induces a reaction within the host that includes systemic signalling and expression of defence-associated genes [4]. Control of *Fusarium culmorum* is currently only partially effective [5].

Fusarium culmorum is a toxigenic fungus producing the type B trichothecenes, deoxynivalenol (DON) and nivalenol (NIV). Trichothecene biosynthesis is a complex process, controlled by several *Tri* genes [1]. Trichothecenes are involved in virulence; disruption of the trichodiene synthase gene reduces virulence [6,7]. It was recently that the translocation of DON from the stem base to the head following infection

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