

Effect of temperature variation on growth and exometabolome of Fusarium graminearum and Fusarium poae in in-vitro co-cultures

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M-A. Garcia¹, S. Bernillon¹, R. Mahmoud², J-A. Guerrero-Analco³, J-L. Monribot-Villanueva³, L. Pinson-Gadais¹, M. Moinard¹, M. Maurin¹, V. Atanasova¹, J-M. Savoie¹, F. Richard-Forget¹, M. Foulongne-Oriol¹

1 INRAE, Mycologie et Sécurité des Aliments (MycSA), FRANCE 2 INRAE, Ecologie fonctionnelle et écotoxicologie des agrosystèmes (ECOSYS), FRANCE 3 Institute of Ecology (INECOL), Advanced Molecular Studies Network, MEXICO

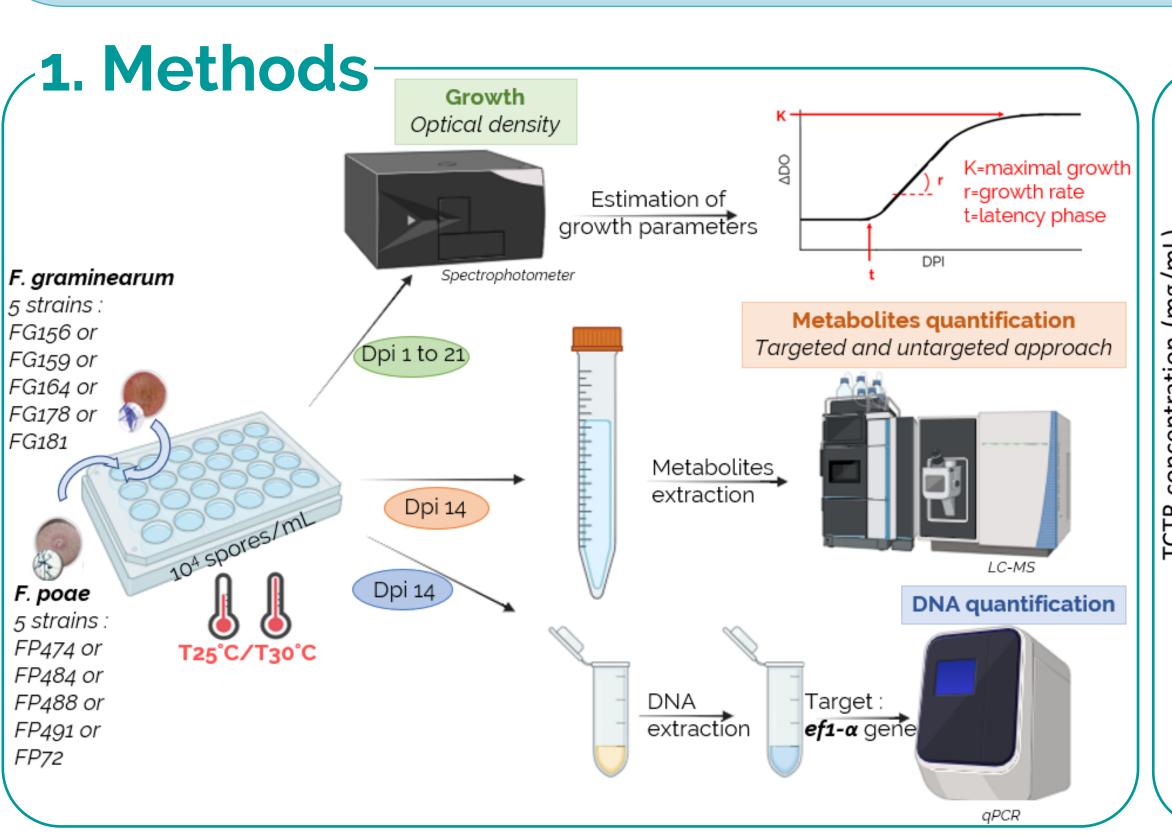




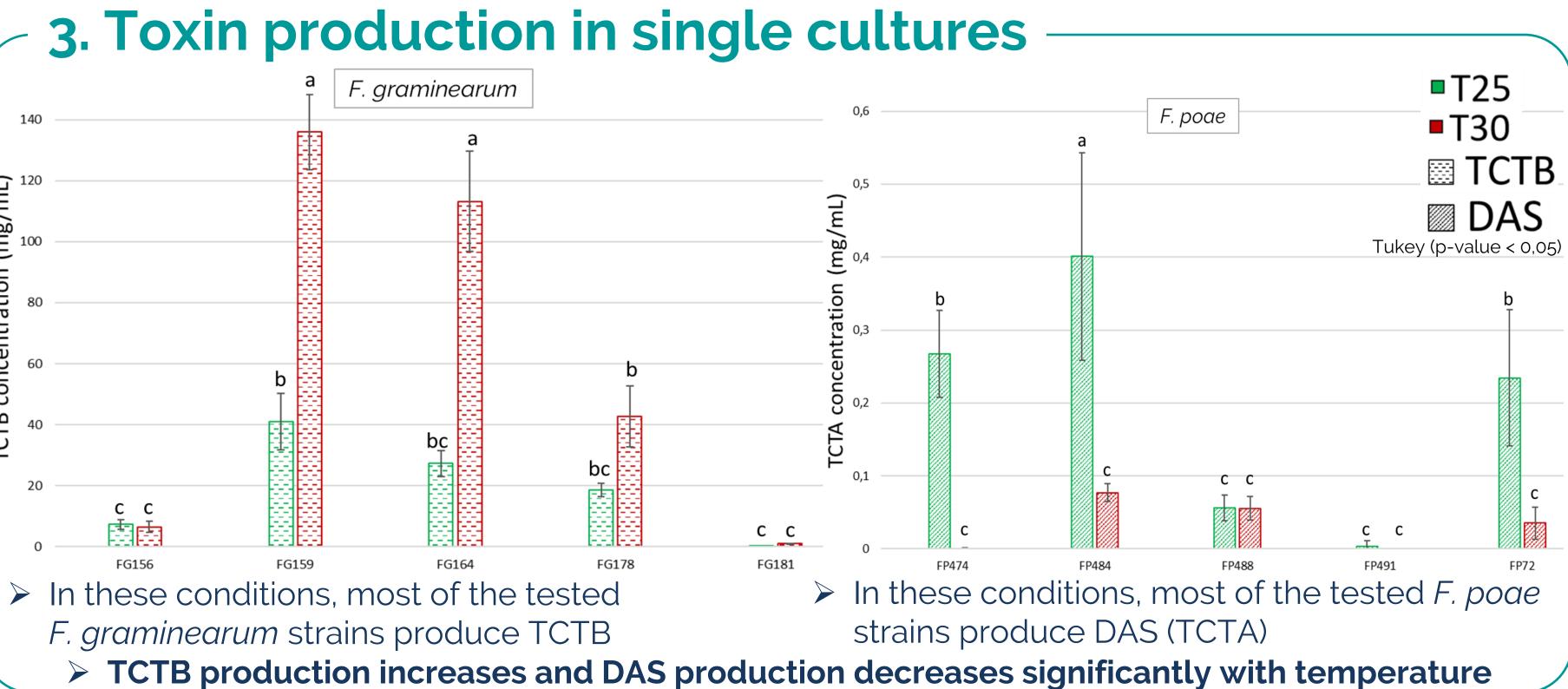


Effect of temperature variation on growth and exometabolome of Fusarium graminearum and Fusarium poae in in-vitro co-cultures

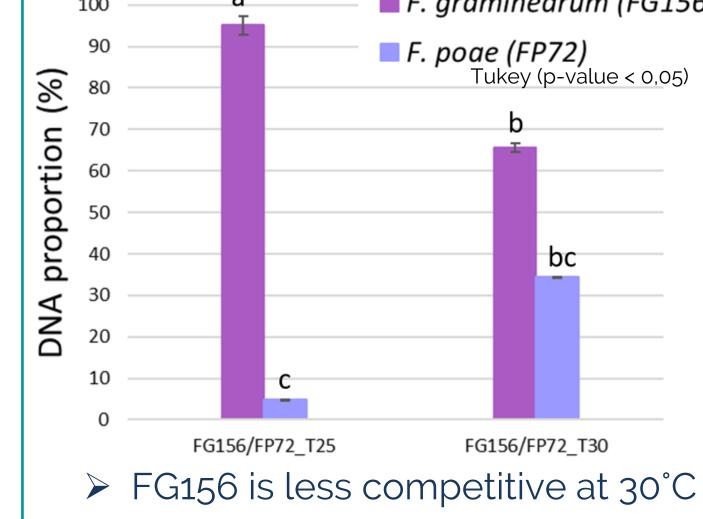
Fusarium Head Blight (FHB) is a devastating disease affecting wheat, mainly caused by fungal species of the Fusarium genus. FHB has a severe impact on yield and kernel quality due to the risk of contamination with mycotoxins [1]. Fusarium graminearum and Fusarium poae are the predominant species causing FHB^[2]. These species produce different types of mycotoxins: F, graminearum is a well-known producer of type B trichothecenes and mainly of deoxynivalenol/DON and its acetyl derivate 15-ADON^[3] while F, poae mainly produces type A trichothecenes including diacetoxyscirpenol/DAS,T-2 and HT-2 toxins^[4]. Previous studies have shown that the occurrence of F. graminearum is promoted by moderately warm summers whereas dry and hot climates are more favourable to F, poae $^{[3,5]}$. Climate change is likely to affect the distribution of Fusarium species infecting wheat and therefore the pattern of contaminating mycotoxins. The purpose of our study is to characterize the effect of increased temperature on the growth and exometabolomes of F, graminearum and F, poae cultivated as single or co-cultures in liquid medium. This new knowledge will help anticipating the consequences of climate change on the mycotoxin risk associated with wheat.

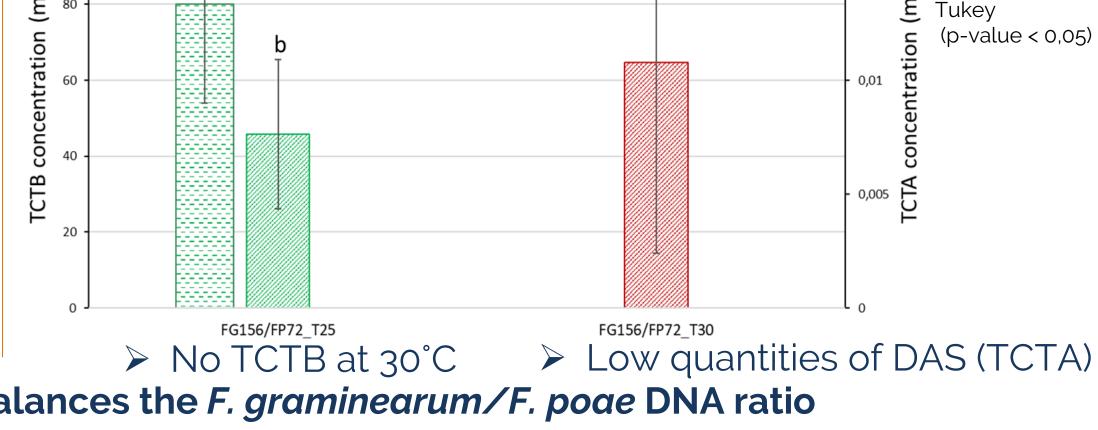


2. Growth parameters in single



4. Growth and toxin production in co-culture (FG156/FP72) **Toxin production DNA** quantification ■T25 F. graminearum (FG156) ■T30 F. poae (FP72) Tukev (p-value < 0.05)





> Rising temperature balances the *F. graminearum/F. poae* DNA ratio and the production of associated toxins 5. Exometabolomes of the co-culture

■T25 cultures ■T30 F. graminearum F. poae (OD_{630nm}) growth K Maximal 0,2 Growth rate r (DPI-1) 0,5 Tukey (p-value < 0,05) Latency phase t (DPI)

> Intraspecific variation in estimated growth parameters > Rising temperature significantly limits (K), accelerates (r)

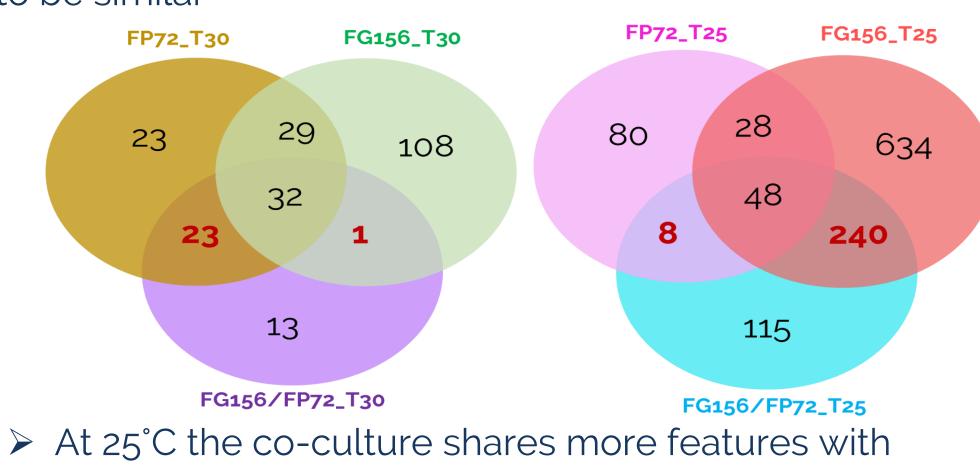
and delays (t) the growth, especially for F. graminearum

o FG156_T30 FG156/FP72_T25 FG156/FP72_T30 FP72_T25 FP72 T30 FP72_T30 & FG156/FP72_T30 FG156_T25 & FG156/FP72_T25 PC 1 (47.2 %)

o FG156_T25

> At 25°C, the exometabolomes of the co-culture and single culture of *F. graminearum* appear to be similar

> At 30°C, the co-culture and single culture of *F. poae* appear to be similar FP72_T25 FG156_T25



F. graminearum than with F. poae

 \triangleright At 30°C the co-culture shares more features with F. poae

Conclusions and perspectives

- The effect of increasing temperature on growth and toxin yield is strain-dependent
- At 30°C, F. poae appears more competitive than F. graminearum in in-vitro co-culture
- At 30°C, the metabolomic profile of the co-culture is closer to that of F. poae and vice versa with F. graminarum at 25°C
 - → This suggests that *F. poae* may become more common in fields in the coming years as a result of climate change
- Pursuing our investigations in simplex and co-cultures at different temperature to highlight the variation between species
- Study the effect of other environmental factors (agricultural practices, wheat variety, sun radiation)
- Going further in identifying the metabolites produced by the co-culture FG156/FP72

Centre

Nouvelle Aquitaine - Bordeaux

71 Avenue Edouard Bourlaux, 33140 Villenave d'Ornon

[1] Bryden W.L. 2012. Mycotoxin contamination of the feed supply chain: Implications for animal productivity and feed security. Animal Feed Science and Technology, 173, 134–158. Tel.: + 33 (0)5 57 12 24 76 Contact: marie-anne.garcia@inrae.fr

Website: https://mycsa.bordeauxaquitaine.hub.inrae.fr

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