

Phenotyping *Fusarium* Head Blight resistance of oat by analysis of morphological and biochemical properties of grains

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Oat grains are often found contaminated with different trichothecenes mycotoxins. These contaminations result from cryptic infections caused by various *Fusarium* species, including *Fusarium graminearum*. The aim of this study was to investigate morphological and biochemical modifications in the grain under high *Fusarium* infection pressure. A special attention is given to β -glucan, a dietary fiber found in oat grains and recognized as Health Promoting Compound (EU and US Health Claims). Here we study the impact of *Fusarium* infections on the β -glucan content of the grain.

Materials and methods

Eight oat varieties have been sown in Changins (VD) in 2014 and 2015, in Cadenazzo (TI) in 2015. Three replicates have been artificially inoculated with DON producing strain of *Fusarium graminearum*. Symptoms of infection were investigated on the panicle and after harvest, Thousand Kernel Weight (TKW), and huskiness were compared between infected and non-infected grains. Protein and β -glucan contents were measured in all samples (using respectively NIRS and Mc Clearly's method).

Results

- The artificial infections did not cause any symptom on panicles.
- No changes of the visual aspect of grains were observed after infection (Figure 1)
- Infection did not impact TKW nor huskiness.
- Yet, infections changed the biochemical properties of the grains, in particular the β -glucan and the protein content (latter not shown).

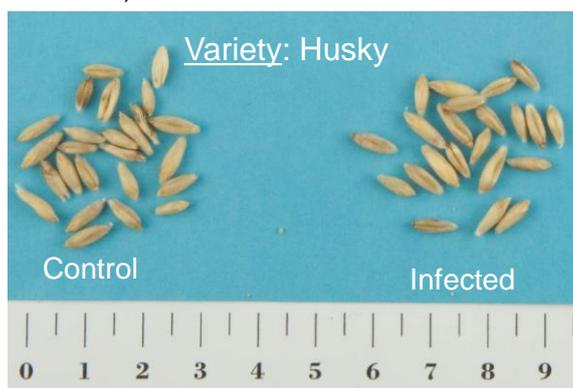


Fig 1: Comparison of visual aspect of infected and non infected oat grains.

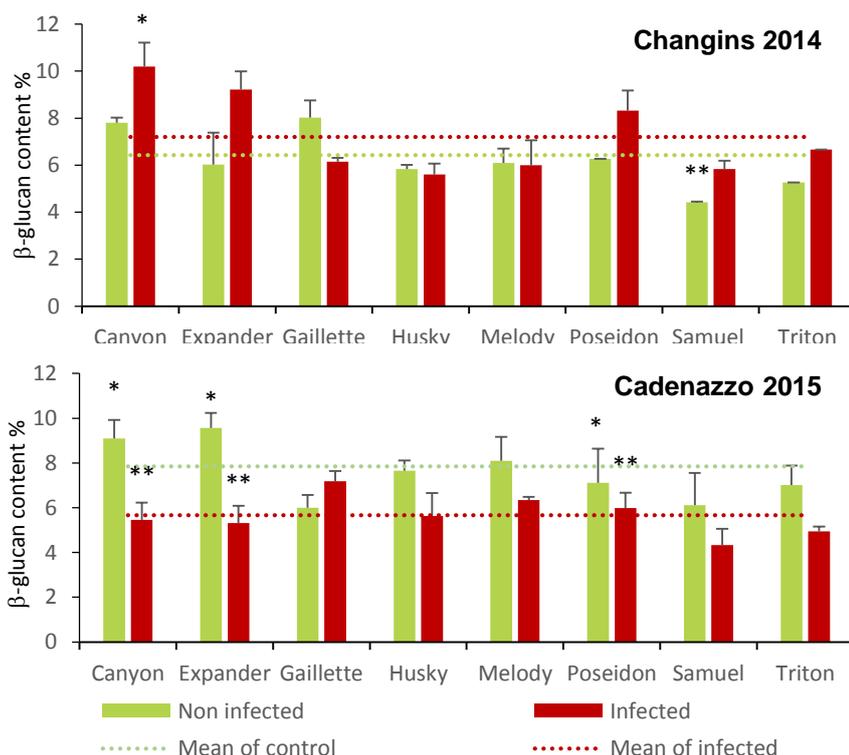


Fig 2: Comparison of β -glucan content in both infected and non-infected grains from 2 experimental sites. Different symbols indicate significant differences in mean of β -glucan content within one environment (p -value < 0.05)

- β -glucan contents in grains were significantly impacted by *Fusarium* infection in Changins 2014 and Cadenazzo (p -value < 0.05) (Fig. 2), while no significant effect was recorded in Changins 2015 (not shown).
- Significant increases or decreases in β -glucan content were observed in infected grains, depending on the environment. Not all varieties were affected to the same extent. β -glucan content was highly altered in cv. Canyon, but remained unaltered for cvs. Gaillette, Husky and Melody.
- Similar results were observed for protein contents (not shown).

- Grain resistance against *Fusarium* can not be detected by morphological observations..
- Resilience of grain biochemical properties is suggested as an indicator of resistance.
- Yet, phenotyping for this resistance type may be hindered by the high impact of environmental conditions on β -glucan content.

