



Effects of Head Morphology and Phenology on Fusarium Infection Processes and Implications for Disease Management in Barley

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Phenology

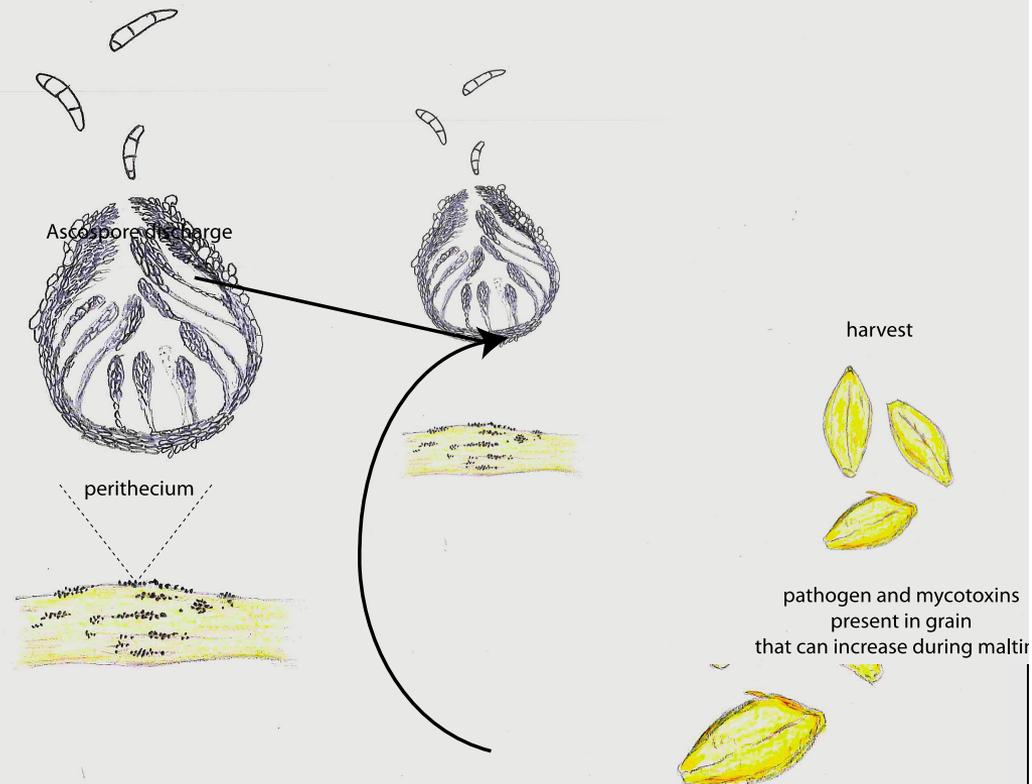


Recurring life cycle stages influenced by genetic and environmental interaction (*flowering time and heading*)

Picture provided by Andrew Friskop, NDSU

Phenology

Important because barley florets are the site of *Fusarium* infection



Barley flowering/anthesis –vs- heading



Heading date is not Flowering time in Spring Barley

Picture provided by Andrew Friskop, NDSU

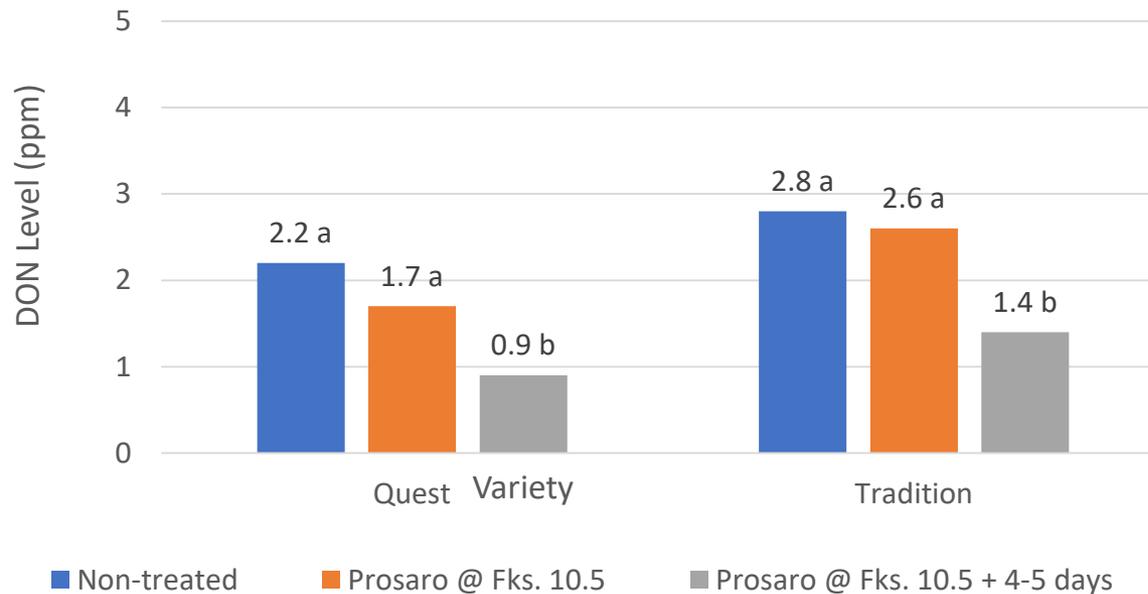
Barley heading stages



Feekes 10 10.3 10.5 (+1-3 d) (+3-6 d)
10.5

Fungicide application in spring barley

Heading +3-5 days application was the most efficacious in spring barley

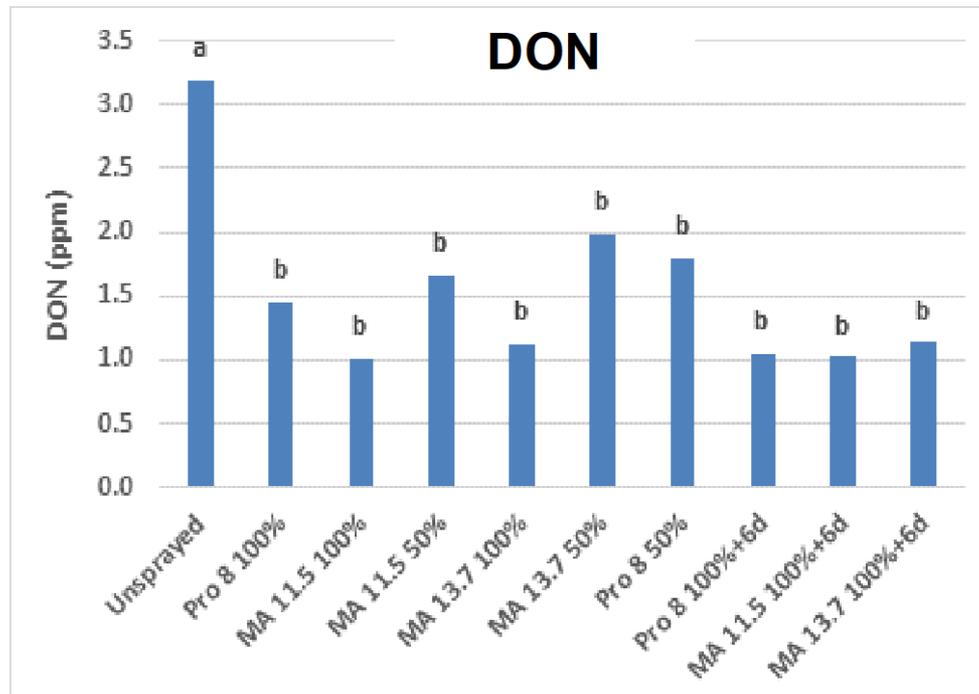


2014 & 15 – Barley IM Trials – LREC and FAR

These IPM studies have been conducted with Prosaro, Caramba, Miravic Ace and Adepidyn



Managing Scab in winter barley with resistance and Fungicides



Comparison of Miravac Ace, Prosaro and Caramba, for management of DON in Winter Barley



Picture provided by Andrew Friskop, NDSU

Timing of fungicide application is similar in both spring and winter barley



Feekes 10 10.3 10.5 (+1-3 d) (+3-6 d)

10.5

~ 6 day window

Variability of heading stages in the field

Picture provided by Andrew Friskop, NDSU



Feekes 10.5 +3 d

10

10.5

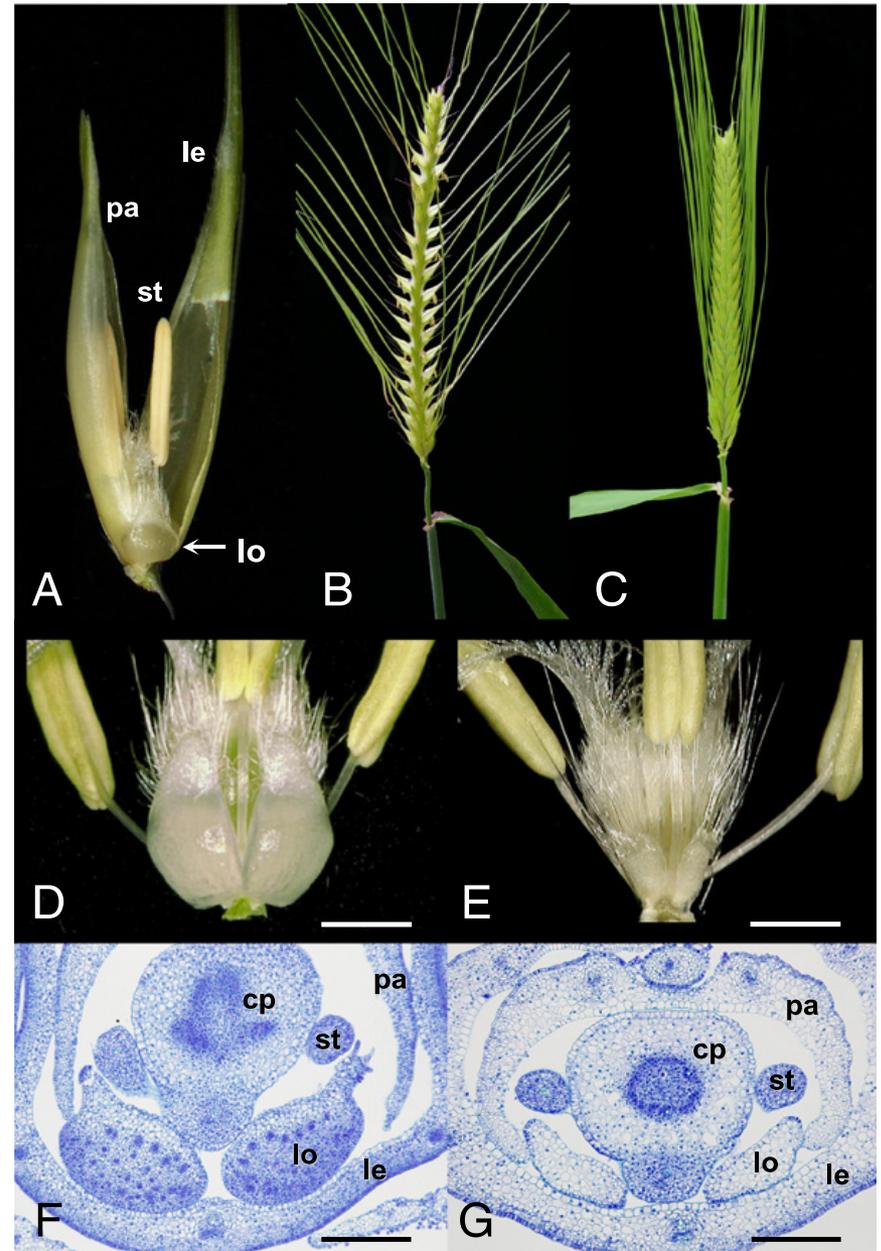
Even more variability in winter barley

More variability in winter barley

A consideration is cleistogamy vs chasmogamy

Cleistogamy also provides a means of escape from fusarium head blight infection

Environment influences appear to influence winter barley cleistogamy which may also have a negative effect on head blight infection



Barley head/floret morphology



2-row

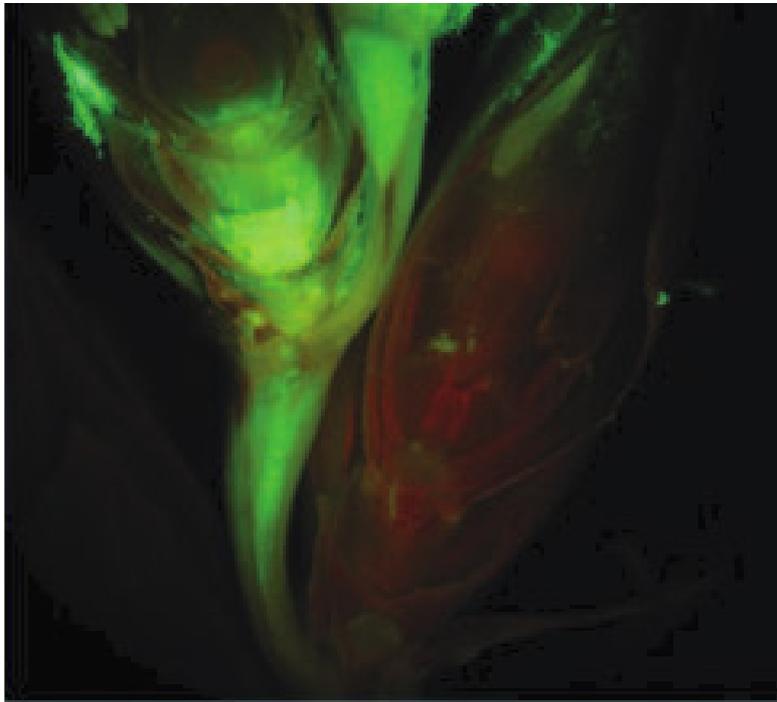


6-row

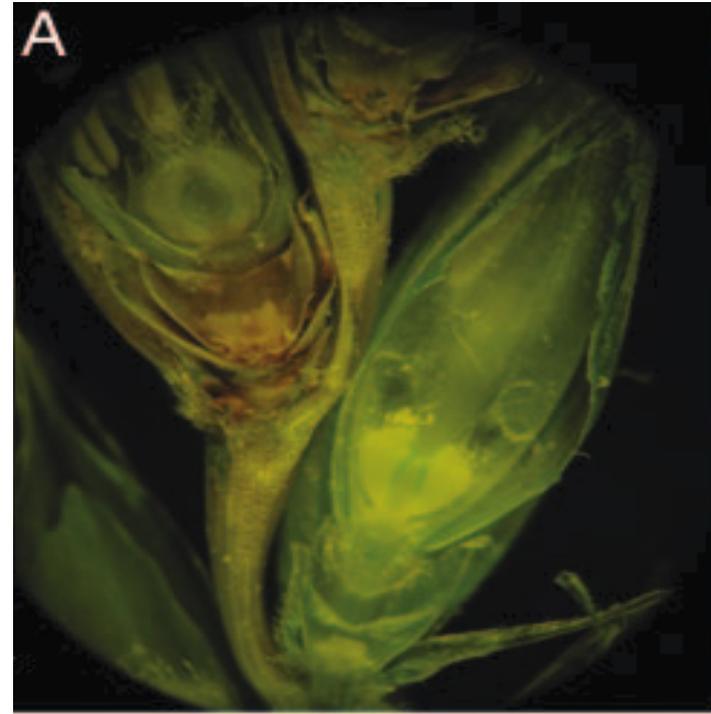
Barley head morphology differences result in distinct infection processes and disease progression

The florets and their morphological characteristics are determinant of pathogen infection and colonization processes

Floret infection in wheat lacking Type II resistance spread through the rachis



wheat



barley

Investigation of head morphology traits that influence infection processes

2-row



Domed trichomes and cork cells

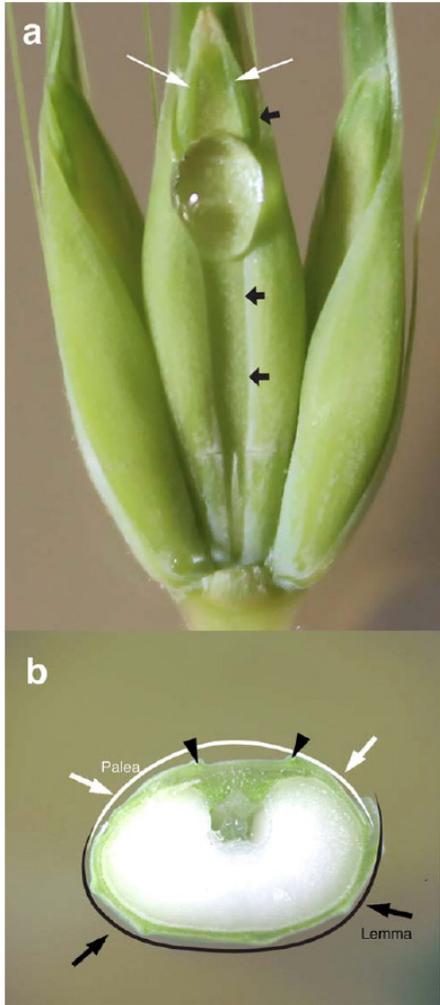
6-row



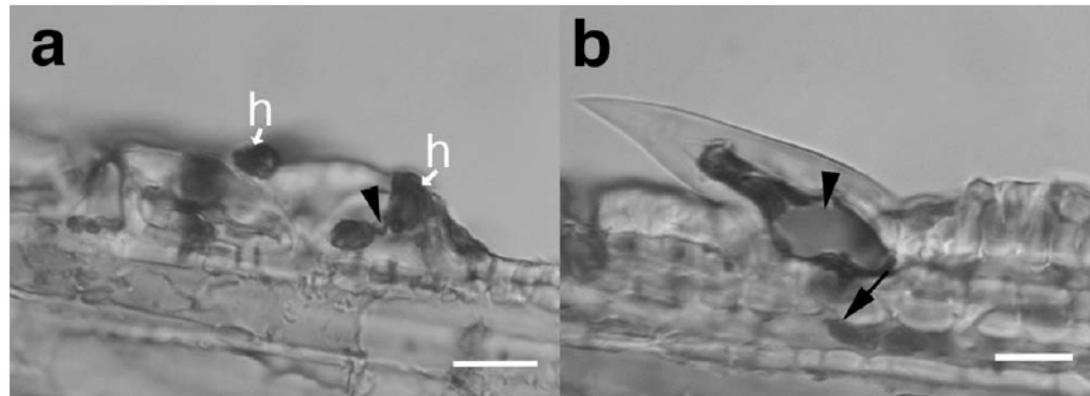
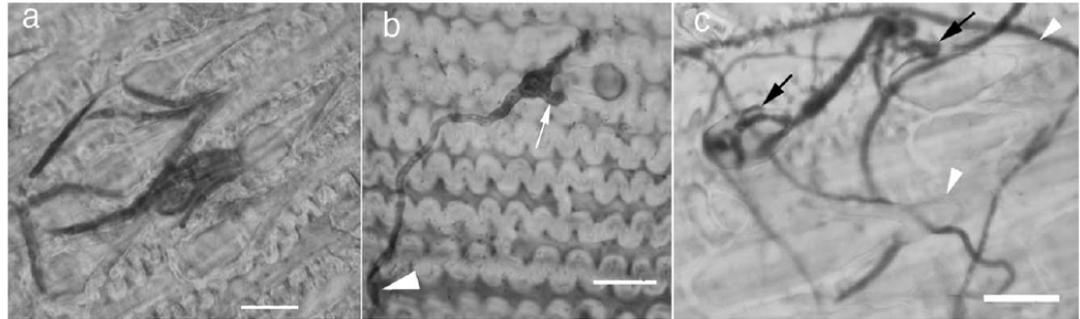
Prickle-like trichomes and cork cells



Trichome morphology influences infection processes



Detached floret



Head/floret maturity influenced disease spread

“Infections of more mature florets supported the spread of hyphae into the vascular bundles, whereas younger florets did not show this spread”



Vascular bundles



Pre-lemma/palea fusion

Post lemma/palea fusion



Conclusions on implications of understanding the effects that barley phenology and head morphology have on FHB management

Timing of fungicide application to protect the entire head across the field

Increase genetic resistance mechanisms



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