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A New Approach to Finding FHB Resistance and Lower DON Accumulation in Two-row Barley

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A microscopic image showing several elongated, spindle-shaped spores of the fungus *F. graminearum* against a dark blue background. The spores are arranged in a few small groups.

History of FHB (*F. graminearum*) in MB / History of Breeding for FHB in MB

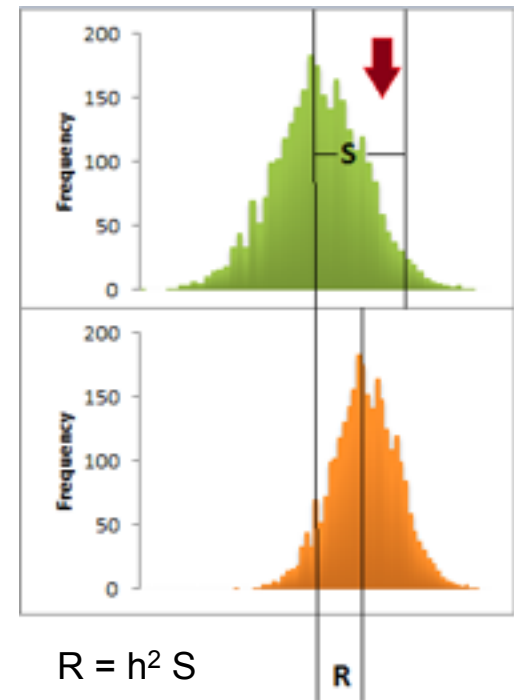


1923 - 1st Manitoba (corn residue)
1980's - *F.g.* & DON - wheat
(Clear and Abramson, 1986)

Characterization of resistant sources in a
Can. Environment (McCallum *et al.*,
1998)

Use of new biotechnology tools to improve FHB resistance

- FHB/DON QTL's only explain a low level of variation & are environmentally specific
- **Genomic Selection (GS):** A new approach for improving quantitative traits in plant breeding populations that uses whole-genome molecular markers simultaneously to calculate Genome Estimated Breeding Values (GEBV's) (Meuwissen *et al.*, 2001)
- GS has demonstrated improvement on lowering FHB and DON accumulation in 6-row barley (Sallam *et al.*, 2015)



Advantages

Time

- Does not require phenotyping of adults
- Decisions can be made in off-season
- Earlier advancement to agronomic trials
- Ability to select in years without disease



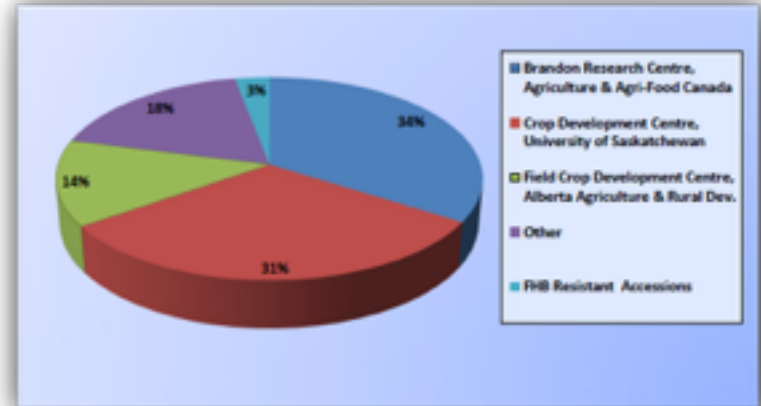
Costs

- Less reliance on expensive mycotoxin assays
- Less labour costs
- Increased accuracy
- Allow phenotyping of more crosses
(population reductions)



Project Progress

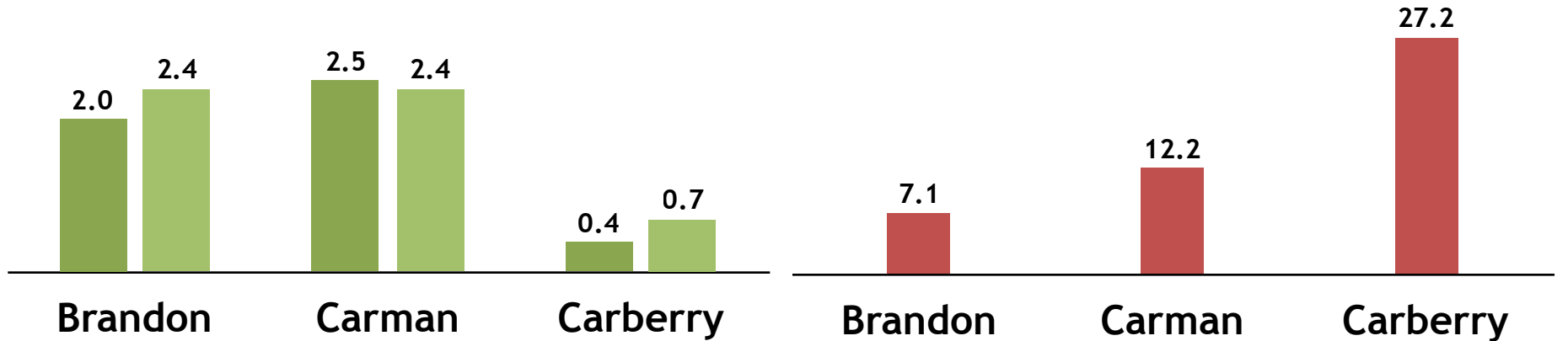
- Created a very large population of barley genotypes (n=400), with range of reaction to FHB & DON accumulation
- Lines were selected with different resistance parentage



Phenotyping

- Conducted in 3 FHB nurseries across MB (RCBD, n=2). 2014 & 2015
- Brandon & Carberry (grain spawn), Carman (conidial spray)
- Data collected: height, heading date (Brandon, Carberry), FHB ratings (0-5, Tekauz scale), & DON content (ELISA)

Relationship between FHB and DON



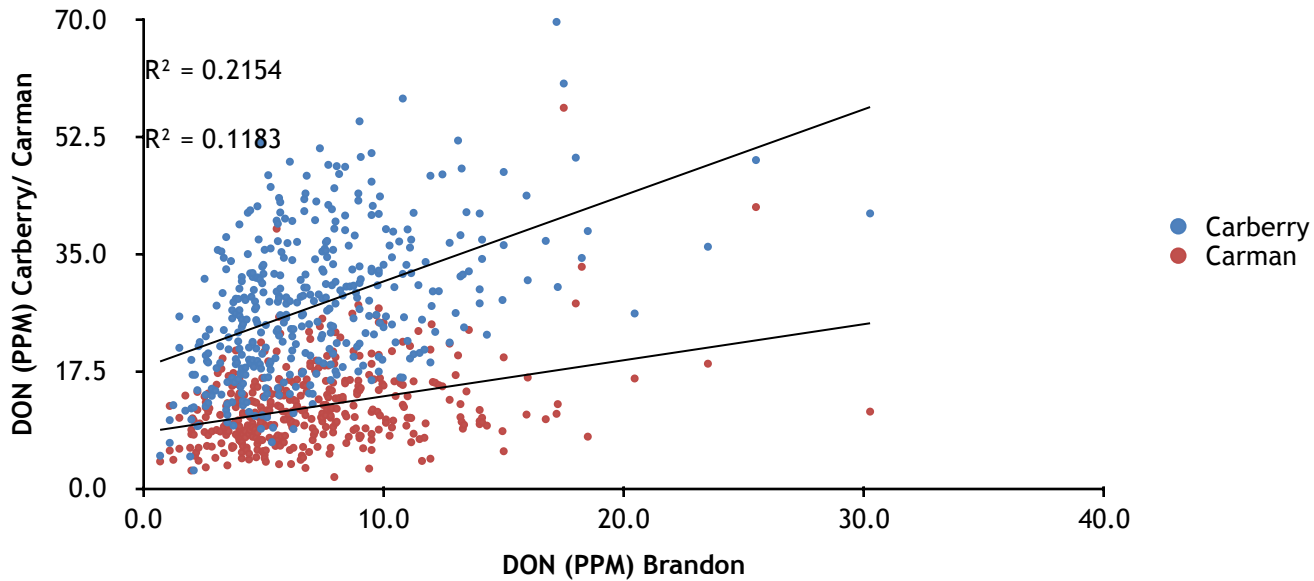
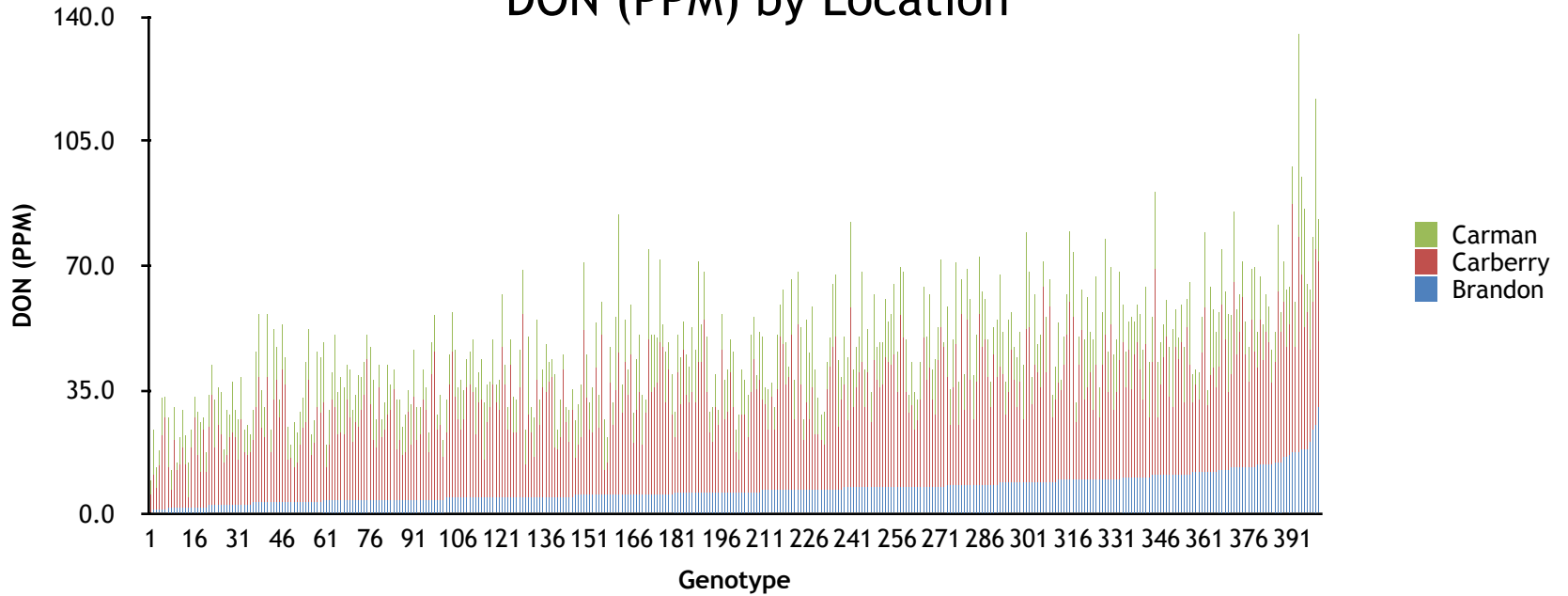
2014-15 FHB Symptoms (0-5) by Location

■ 2014 ■ 2015

2014 DON content (PPM) by Location

■ 2014

DON (PPM) by Location



Acknowledgements

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