

## S-26

### FHB can be defeated by a systemic approach

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Based on registration trial data, to create agronomic wheat with high FHB resistance, the systemic approach (Comeau *et al.* 2010) was significantly more successful than other approaches used by other breeding programs, with  $p$ -levels from  $p < 0.05$  to  $p < 0.00006$  for many key traits. Complex crosses were selected with complex stress for a few generations ( $F_1$  to  $F_5$ - $F_7$ ). Stresses included BYDV, *Fusarium* and rust. Resistant germplasm was shared with public and private breeding projects. Breeders used it in crosses and also isolated candidate lines for cultivar registration directly from the systemic germplasm. For disease resistance traits, and especially for FHB, the systemic-derived lines significantly surpassed other candidate lines. The systemic approach led to more protein, and sometimes, better yield potential. Some systemic lines are high yielders, and others, low yielders. The systemic approach slightly reduced the undesirable correlation of high protein with low yield. Putting high FHB resistance in a short statured plant remains a challenge; a compromise with adequate lodging resistance is possible. Other methods exist to create FHB resistant lines, but so far the systemic way seems the best. Breeders should pay more attention to those ideas, in which focus is on globally better phenotypes rather than on specific genes. The method is adaptable to other crops.

Reference: Comeau A, et al. 2010. Systemic heuristic approaches guide the interaction of enhanced genetic diversity and complex stresses to generate better wheat germplasm faster and at lower cost. In: Kovalchuk I., Kovalchuk O. Genome Instability and Transgenerational Effects. Nova Sc. Publ.