Starke-II NIL based common bunt resistance gene mapping

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NordGen has a 6 genebank accessions developed by MacKay by crossing the variety Starke-II with bunt resistant lines, and backcrossed to Starke-II about 7-8 times while maintaining resistance. The precise protocol is unfortunately lost. The NILs possesses Bt1(NGB-11503), Bt5(NGB-16106), Bt6 (NGB-11504), Bt9 (NGB-11505), Bt10 (NGB-11506) and an unknown gene (NGB-16160). The accessions have already been phenotyped, and resistant lines from each accession have been selected (Borgen et al. 2018A). In the LIVESEED project, all NILs and Starke II have been genotyped with the TG25K array (Bacanovic-Sisic et al 2021).

NILs and Starke II had all but 23-202 markers in 1-4 linkage groups in common. Linkage groups for each NIL was extracted and filtered against differential lines containing the Bt gene in question. Chromosomal locations of remaining markers were compared to suggested locations from the literature, enabling separating the major Bt gene from additional genes or QTLs.

- Bt1 was mapped to chromosome 2B in the interval 789,867,236-801,253,554 bp.
- Bt5 was mapped to chromosome 1B in the interval 285,345,287-285,608,205 bp. Corresponding markers in the bunt resistant varieties Globus and Tommi widely used in European bunt resistance breeding, confirms the phenotypic data indicating that these lines carry Bt5 resistance (Borgen et al. 2018B).
- Bt9 was remapped to chromosome 6D in the interval 469,248,476 bp – 469,919,743 bp. (Steffan et al. 2017; Wang et al. 2019)
- The Bt6 NIL (NGB-11504) seemed to be identical to the Bt9 NIL (NGB-11505) indicating miss information about this line, and no conclusion is therefore drawn for Bt6.
- Bt10 was remapped to chromosome 6D in the interval 1,773,421 bp – 11,407,937 bp. (Menzies et al. 2006)
- Unknown resistance in Starke NIL NGB-16160 is expected to be Bt12 and was remapped to chromosome 7D in the interval 7,073,045 bp – 10,835,093 bp. (Muellner et al., 2020)

All markers/intervals were analysed against the remaining 266 LIVESEED lines revealing that they were present in lines with and without the Bt gene. Whether the marker matches in other lines are linked to resistance or not is not known. An example is the presence of the Bt12 markers in Thule III having Bt13 (Goates 2012).

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