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Are bzh semi-dwarf hybrids deprived with regard to plot front-border effects in yield trials?

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Winter oilseed rape (*Brassica napus*) bzh semi-dwarf hybrids from crosses between bzh dwarf lines and normal-type lines are characterized by a shortened and more compact growth-type, improved winter hardiness and drought tolerance (Pinochet and Renard 2012). Moreover, they show equal yield, higher harvest index and higher nitrogen use efficiency compared to normal-type hybrids (Miersch et al. 2016). Despite of these advantages, semi-dwarf varieties have only a small market share. It is under debate, whether semi-dwarfs are deprived in plot yield trials compared to normal-type hybrids with regard to plot front border effects. These effects could be caused by the reduced shoot height or by differences in root parameters.

We analyzed the plot front border effect of eight near-isogenic hybrid pairs (semi-dwarf vs. normal-type) in three environments (2016–18), and two treatments (core-plot vs. complete plot harvest) in central Germany. Root electrical capacitance (EC) measurement (Chloupek 1972, 2006) estimated root system size. Transcript abundance of bzh and Bzh alleles was analyzed in seedlings.

Yield results across environments showed a higher exploitation of the front plot border by semi-dwarf hybrids (11.2%) in contrast to normal-type hybrids (9.6%). Semi-dwarf and normal-type hybrids did not vary significantly in seed yield of core-plots, but in straw yield and harvest index. The root EC of semi-dwarfs was (non-significantly) higher than of normal-types in the humid season 2017, whereas it was equal in the dry 2018 season. Genetic variation for root EC was significant. The expression analysis revealed that the BZH gene is expressed 3 – 5 times stronger in hypocotyls than in roots, the semi-dominant effect of the bzh and Bzh alleles in both tissues became apparent.

It can be concluded that semi-dwarf types are not deprived due to plot front-border effects in yield plot trials in comparison to normal-types. Root EC detected variation between genotypes. The bzh and Bzh alleles are not only expressed in shoots, but also in roots. The bzh effect on roots should be considered in semi-dwarf breeding.

Chloupek O (1972) *Biologia Plantarum* 14: 227–230.

Chloupek O et al. (2006) DOI:10.1007/s00122-005-0147-4.

Pinochet X, Renard M (2012) DOI:10.1051/ocl.2012.0456

Miersch S et al. (2016) DOI:10.2135/cropsci2015.09.0554

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