

Causes of different tissue strength, changes during storage and effect on the storability of sugar beet genotypes

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Abstract

Genetic variation in the tissue strength of sugar beet (*Beta vulgaris* L.) roots has been found in recent studies. There are indications that tissue strength influences damage susceptibility and storability. The objective of this study was to analyse the impact of storage on tissue strength, to determine causes for differences in tissue strength and to find possible relations between tissue strength, damage susceptibility and storability of sugar beet genotypes. For this purpose, trials with six sugar beet genotypes were conducted in seven environments across Germany in 2018 and 2019, followed by a screening trial with 12 commercial genotypes at one location in 2020. Tissue strength changed during storage depending on the growing environment, but independently of the genotype; puncture resistance increased by 0.35MPa. The genotypic tissue strength was mainly determined by the cell wall content (r^2 up to 0.97), less by the cell wall composition. For sugar beet genotypes, the relationship between tissue strength and storability could be explained by the fact that root tip breakage and subsequent storage losses tended to decrease with higher tissue strength, as shown by principal component analysis (PCA). Introducing tissue strength as a variety trait in breeding and official variety trials could thus contribute to reduced harvest and storage losses in the future.