

A NEW HYPERGRAVITROPIC ROOT MUTANT FROM THE BARLEY TILLMORE COLLECTION

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Root architectural traits play a critical role in crop adaptation to different environmental conditions; thus, they have started to be considered in breeding programs aimed at the release of new cultivars with improved soil exploration and water and nutrients absorption, lodging resistance, and yield.

One of the most important root architectural traits is Root Growth Angle (RGA), namely the direction of root growth in respect of the gravity vector. RGA potentially affects the volume of the soil explored or mean and maximum root depth. For a given growing root tip at a given time, competing gravitropic versus antigravitropic offset mechanisms act to set RGA. The TILLMore collection (Talamè et al 2008), is an important genetic resource that allowed us to identify the first two genes in barley that controlled RGA, *EGT1* and *EGT2* (Kirschner et al 2021; Fusi et al 2022). By means of a new root phenotypic screening, new root mutants have been identified including TM1354 that shows hypergravitropic root system. Genomic DNA of TM1354 underwent WGS sequencing using ILLUMINA. No SNPs were found in previously identified *EGT* genes, suggesting that a mutation in a new root hypergravitropic gene is responsible for the control of the root growth angle. Based on the sequence of more than 20 mutants from TILLMore collection, the mutation frequency is estimated on 1/480 kb, with about 60 mutations in the exome of each line. When compared with Morex wt, TM1354 showed not only a hypergravitropic root system, but also erected and rolled leaves. Genetic mapping by bulk segregant analysis and genetic complementation analysis with known *EGT* mutants are in progress.