Science Societies

Belowground Cameras and Machine-Learning Analysis for Root Phenotyping

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Researchers used in-field, belowground cameras known as minirhizotrons to collect thousands of root images of the novel perennial grain crop intermediate wheatgrass, or Kernza. They analyzed images using the open-source machine-learning software RootPainter and used these data to bridge the gap between above- and belowground traits and generate information that can be used in applied breeding, e.g., inclusion of data in genomic selection models. Results showed that grain yield was weakly positively correlated with total root length, area, and volume, and that there was moderate heritability of root traits, suggesting that there is genetic variation in root traits that could be selected for as part of a breeding program.

These findings demonstrate the potential for in-field root phenotyping and genomic selection to aid in advancing crop varieties with specific root traits important for ecosystem services.

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