

 Open access • Journal Article • DOI:10.1079/PGR2005104

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Published on: 01 Apr 2006 - Plant Genetic Resources (Cambridge University Press)

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**Volume 4, Issue 1**

April 2006 , pp. 20-24

Traitmill™: a functional genomics platform for the phenotypic analysis of cereals

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<https://doi.org/10.1079/PGR2005104>

Published online: 01 February 2007

Abstract

The improvement of quality and quantitative traits in industrial crops is among the most important goals in plant breeding. Many traits of interest are controlled by multiple genes and improvements have so far only been obtained through conventional breeding. The use of biotechnological tools to modify quantitative traits is highly challenging. CropDesign has developed TraitMill™, an automated plant evaluation platform allowing high-throughput testing of the effect of plant-based transgenes on agronomically valuable traits in crop plants. The focus of the platform is currently on rice, a good model for other important cereals such as maize and wheat. TraitMill™ offers a high-throughput prediction of gene function. Genes of validated function that confer trait improvement can then be transferred to other cereal crop species such as maize, but also to dicots, trees and ornamentals. TraitMill™ involves the following key components: (i) selection of candidate trait improvement genes among genes involved in signal transduction, cell cycle control, transcription, nutrient metabolism, etc.; (ii) a suite of validated constitutive or tissue-specific promoters from rice allowing for the selection of the most appropriate promoter-gene combination in view of the desired trait improvement; (iii) an industrialized plant transformation system generating tens of thousands of transgenic plants annually; and (iv) a robotized trait evaluation set-up for plant evaluation, proprietary image analysis software for measuring plant performance parameters and statistical analysis of results.

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