Simple system using natural mineral water for high-throughput phenotyping of Arabidopsis thaliana seedlings in liquid culture

Submitted by Emmanuel Lemoine on Thu, 02/12/2015 - 13:11

Titre	Simple system using natural mineral water for high-throughput phenotyping of Arabidopsis thaliana seedlings in liquid culture
Type de publication	Article de revue
Auteur	Benamar, Abdelilah [1], Pierart, Antoine [2], Baecker, Volker [3], Avelange-Macherel, Marie-Hélène [4], Rolland, Aurélia [5], Gaudichon, Sabine [6], Di Gioia, Lodovico [7], Macherel, David [8]
Editeur	Dove Medical Press
Type	Article scientifique dans une revue à comité de lecture
Année	2013
Langue	Anglais
Date	2013
Pagination	1 - 15
Volume	4
Titre de la revue	International Journal of High Throughput Screening
ISSN	1179-1381
Résumé en anglais	Background: Phenotyping for plant stress tolerance is an essential component of many research projects. Because screening of high numbers of plants and multiple conditions remains technically challenging and costly, there is a need for simple methods to carry out large-scale phenotyping in the laboratory.Methods: We developed a method for phenotyping the germination and seedling growth of Arabidopsis (Arabidopsis thaliana) Col-0 in liquid culture. Culture was performed under rotary shaking in multiwell plates, using Evian natural mineral water as a medium. Nondestructive and accurate quantification of green pixels by digital image analysis allowed monitoring of growth. Results: The composition of the water prevented excessive root elongation growth that would otherwise lead to clumping of seedlings observed when classic nutrient-rich medium or deionized water is used. There was no need to maintain the cultures under aseptic conditions, and seedlings, which are photosynthetic, remained healthy for several weeks. Several proof-of-concept experiments demonstrated the usefulness of the approach for environmental stress phenotyping. Conclusion: The system described here is easy to set up, cost-effective, and enables a single researcher to screen large numbers of lines under various conditions. The simplicity of the method clearly makes it amenable to high-throughput phenotyping using robotics.
URL de la notice	http://okina.univ-angers.fr/publications/ua7855 [9]
DOI	10.2147/IJHTS.S40565 [10]
Lien vers le document	http://dx.doi.org/10.2147/IJHTS.S40565 [10]

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