About the book

This collection reviews the wealth of research on advances in phenotyping and the influential role it plays in identifying the relative importance of genetic, environmental and agronomic factors in determining complex plant traits, such as yield and resource-use efficiency.

About the editor

Dr Achim Walter is Professor of Crop Science and Head of the Crop Sciences Group in the Department of Environmental Systems Science in the Institute of Agricultural Sciences in ETH Zurich, Switzerland. He is a member of the scientific advisory boards of several national and international agricultural research institutions. He is internationally-renowned for his research in image-based phenotyping of plant shoots and roots.

Available in print and digital formats:
ISBN - print 978-1-78676-856-8
Pages 404
Pub. Date June 2022
Price £150/$195/€180/C$255
Series No AS117

Order via our online bookshop at https://bdspublishing.com, your usual book supplier, or pass to your librarian.
Enquiries to info@bdspublishing.com

For a complete list of titles visit www.bdspublishing.com
Empowering knowledge - delivering sustainable agriculture

Advances in plant phenotyping for more sustainable crop production
Edited by: Professor Achim Walter, ETH Zurich, Switzerland

Part 1 The development of phenotyping as a research field
2. The evolution of trait selection in breeding: from seeing to remote sensing: Matthew Reynolds, Francisco Pinto, Liana Acevedo, Francisco J. Pinera-Chavez, and Carolina Rivera-Amado, International Maize and Wheat Research Center (CIMMYT), Mexico

Part 2 Sensor types
3. Advances in optical analysis for crop phenotyping: Jian Jin and Tanzeel U. Rehman, Purdue University, USA; and Qin Zhang, Washington State University, USA
4. Advances in the use of thermography in crop phenotyping: David M. Deery, CSIRO Agriculture and Food, Australia
5. Advances in the use of X-ray computed tomography in crop phenotyping: Stefan Gerth, Norman Uhlmann and Michael Salamon, Fraunhofer EZRT, Germany

Part 3 Carrier/delivery systems
6. Field robots for plant phenotyping: Rick van de Zedde, Wageningen University and Research, The Netherlands
7. Advances in the use of aerial systems/UAVs for crop phenotyping as examples for lean, low-cost, high-throughput field crop phenotyping systems: Helge Aasen, Institute of Agricultural Sciences, ETH Zurich and Remote Sensing Team, Division of Agroecology and Environment, Agroscope, Switzerland; and Lukas Roth, Institute of Agricultural Sciences, ETH Zurich, Switzerland

Part 4 Data analysis
8. Meeting computer vision and machine learning challenges in crop phenotyping: Hanno Scharr, Institute of Bio- and Geosciences: Plant Sciences (IBG-2) and Institute for Advanced Simulation: Data Analytics and Machine Learning (IAS-8), Forschungszentrum Jülich, Germany; and Sotirios A. Tsafarlis, The University of Edinburgh and Alan Turing Institute, UK
9. Digital phenotyping and genotype-to-phenotype (G2P) models to predict complex traits in cereal crops: Nicolas Virlet, Rothamsted Research, UK; Danilo H. Lyra, Biometrics and Breeding Research, BASF, Belgium; and Malcolm J. Hawkesford, Rothamsted Research, UK
10. The role of crop growth models in crop improvement: integrating phenomics, envirotyping and genomic prediction: Jana Kholová, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India; Amir Hajjarpoor, UMR DIADE, Université de Montpellier, Institut de Recherche pour le Développement (IRD), France; Vincent Garin, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Mali; William Nelson, Gottingen University, Germany; Madina Diacoumba, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Mali; Carlos D. Messina, Pioneer Hi-Bred International, USA; Graeme L. Hammer, Queensland Alliance for Agriculture and Food Innovation - The University of Queensland, Australia; Yunbi Xu, Chinese Academy of Agricultural Sciences, China and International Maize and Wheat Improvement Center (CIMMYT), Mexico; Milan O. Urban, International Center for Tropical Agriculture (CIAT), Colombia; and Jan Jarolímk, Czech University of Life Sciences (CZU), Czech Republic

Part 5 Case studies
11. Using phenotyping techniques to analyse crop functionality and photosynthesis: Eva Rosenqvist, University of Copenhagen, Denmark
12. Using phenotyping techniques to predict and model grain yield: translating phenotyping into genetic gain: Thomas Vatter and José L. Araus, University of Barcelona and AGROTECNIO (Center for Research in Agrotechnology), Spain
13. Automated assessment of plant diseases and traits by sensors: how can digital technologies support smart farming and plant breeding?: Anne-Katrin Mahlein, Institute of Sugar Beet Research, Germany; Jan Behmann, Bayer Crop Science, Germany; David Bohnenkamp, BASF Digital Farming GmbH, Germany; René H. J. Heim, UAV Research Centre (URC), Ghent University, Belgium; and Sebastian Streit and Stefan Paulus, Institute of Sugar Beet Research, Germany