

Uses of Functional Phenotyping

Field	Mission	Potential Users	Main Advantage
Data acquisition	<ul style="list-style-type: none"> • Whole-plant, soil and atmospheric data collection • Real-time analysis and web storage • Continuous and simultaneous collection of data from numerous plants and sensors 	Research and development (both academic and industrial)	<ul style="list-style-type: none"> • Real-time analysis • High-resolution (momentary) analysis of the soil–plant–atmosphere continuum (SPAC) • Fast and dynamic decision-making for the researcher
Abiotic stress	Screening for genotypes, genes or treatments associated with reduced yield penalties under stressful conditions	Research and development (both academic and industrial)	<ul style="list-style-type: none"> • Reducing the number of candidates to be tested in the field • Improving the design of the field experiment • Bringing new chemicals or cultivars to market more quickly
Optimization	Selection of the right chemical (from among many) and optimal application rate	Fertilizer and chemical companies	<ul style="list-style-type: none"> • Reducing the time to market • Understanding how the product works
Indoor growth	Optimization of growth-chamber and greenhouse conditions based on plant performance in different parts of the facility	Cannabis/berry industries	<ul style="list-style-type: none"> • Biofeedback control of the growth facility • No need to involve image analysis • No problem of dense vegetation interference • Optimization of levels of irrigation, nutrients and biostimulants
Big data	<ul style="list-style-type: none"> • Collection of data from the root, shoot, soil and atmosphere, continuously and simultaneously from numerous plants • Study of the above cross-interactions and their feedback loops 	Research and development (both academic and industrial)	AI and deep-learning source; construction of tables containing multiple physiological profiles of numerous plants under different conditions
Rootstock performance	Study of the physiological properties of the root	Research and development (both academic and industrial)	<ul style="list-style-type: none"> • Identification of root functional characteristics • Early identification of root malfunctions due to biotic or abiotic factors
Whole-plant physiology	Improved understanding of whole-plant water relations	Research and development (both academic and industrial)	<ul style="list-style-type: none"> • Whole-plant response profile to dynamic environmental changes • High-resolution comparison of small differences in physiological profiles
Multi-treatment experiments	Truly randomized experimental set-ups with automated mixing of irrigation and chemical solutions and delivery capabilities	Research and development (both academic and industrial)	<ul style="list-style-type: none"> • Control of irrigation in terms of time, weight, soil moisture and/or daily transpiration • Control of the concentration and duration of any treatment delivered through the irrigation system