ABSTRACT

"Phenotyping in crop science: Matching breeder's needs and scientific hunger"

Prof Achim Walter
ETH Zurich
Institute of Agricultural Sciences
Zurich
SWITZERLAND

Plant and crop sciences are expected to provide innovative solutions to unprecedented, global challenges: Global population increase, the need to find innovative plant-based solutions for the production of food, feed, fibres and fuel as well as climate change require both an improved understanding of plant function as well as clear roadmaps on how to transfer basic knowledge to applicable solutions. Joint establishment of new technologies together with sustainable, locally adapted and system-specific research approaches are required to address these challenges.

In this talk, I will give a motivation and an overview of the methodologies developed in and applied by our group to perform plant phenotyping. The central motivation of our group is to establish innovative pathways to identify and generate more versatile and efficiency-oriented crop production systems. Imaging procedures acting at different spatial and temporal scales are core elements of the toolbox of our interdisciplinary team. In climate chambers, greenhouses and on field sites, we apply visual, near-infrared and thermal imaging to quantify shoot and root architecture, dynamic and short-term growth processes as well as photosynthesis, gas exchange and compound composition of major and alternative crops alike. These 'phenotyping' analyses, in concert with a range of approaches from plant ecophysiology, breeding and molecular analysis, will help elucidating differences between plant genotypes. Moreover they will facilitate the optimization of crop production systems to regionally differing ecological niches or to an altering climate. Most importantly, these phenotyping approaches will facilitate an improved understanding of basic rules governing plant-environment-management interactions. This in turn is a necessary prerequisite to ameliorate the knowledge transfer between lab and field as well as between plant biology and agricultural sciences, thereby allowing for improved agricultural plants and practices in the future.