

## Why Field-based Phenotyping?: Theory and Practice

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Crop production must be doubled by 2050 to meet the predicted production demands of the population worldwide. However, it will be a huge challenge for plant breeders since crop yields would have to increase at a rate of 2.4% per year, not 1.3% which is the current rate. Extensive breeding efforts over the past 50 years have been responsible to increase cereal yields three times and continuing advances in the techniques available to breeders offer the potential to increase the rate of genetic improvement. Utilizing new molecular tools reached their full potential to dissect the genetics of quantitative traits, while all these valuable information generated is limited by the availability of phenotype data for maximum utilization to improve crops much further. Hence, phenotyping are the key component to ensure genetic improvement of crops for future food security at this moment. Consequently, there has been increased interest in highthroughput phenotyping platforms (HTPPs) in recent years. Among those HTPPs, those in the controlled environments would offer valuable information for biological questions rather than for the practical information for the breeding purposes unlike field-based HTPPs although it would be far more challenging due to the notoriously heterogeneous condition of fields and the inability to control environmental factors. Nonetheless, these obstacles should be dealt with considering the urgent increasing demands for the crop production. In the current presentation, the current technologies as well as the difficulties of HTPPs, especially in the field, will be addressed and discussed so that those researchers who are interested in HTPPs can be aware of these issues for their future studies.

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