Organized Session 7

**CIGR-WG 12 (Artificial Intelligence and Data Science)**

Proximal Sensing and Artificial Intelligence in High Throughput Plant Phenotyping

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Concept of Organized Session

Accelerating crop breeding through high-throughput genotyping, phenotyping, and improving cultivation efficiency through understanding crop growth conditions will provide the basis for increasing and stabilizing food production to support the SDGs and for realizing "society 5.0" in agriculture. The development of high-speed gene sequencing technology has dramatically accelerated genome analysis, and the genomic sequences of numerous major crops have been determined. However, the analysis of plant phenotypes remains at a conventional qualitative analysis stage, often destructive, human-dependent, and extremely slow, and has become a bottleneck in research development and cultivation support. Therefore, research and development for fast, accurate, and stable field phenotyping are gaining momentum worldwide, using the latest information and communication technology.

Recently, high-throughput phenotyping using proximal sensing and machine learning techniques has attracted the most attention, and lots of works have reported that such techniques can help accelerate the advancement of agricultural innovation. However, it is still a challenging approach to be used widely because of the following reasons: Short of hardware, and software solutions, complicated scene of agriculture field for sensing, limited valuable training dataset for AI models, phenotypic variation due to environmental and cultivation conditions even if they have the same genetic information.

Therefore, this organized session focuses on solving the above limitations and welcomes research topics that introduce techniques, algorithms, and solutions (such as software, hardware, and dataset) related to proximal sensing and artificial intelligence in high throughput plant phenotyping.

**Keywords:** UAV, Rover, Cable camera, image processing, machine learning, deep learning.