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Oral sessions | KL-02 | O24: Smart Farming (Remote Sensing, ITC)

## [O24] Smart Farming (Remote Sensing, ITC)

\*Sponsored by Asian Association of Agricultural Colleges and Universities (AAACU)

Chair: Yoshio Inoue (The University of Tokyo, Japan)

Chair: Sutkhet Nakasathien (Kasetsart University, Thailand)

Chair: Hiroshi Ehara (Nagoya University, Japan)

Fri. Sep 10, 2021 9:45 AM - 11:45 AM Room 2 (Oral) (Farming System)

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10:25 AM - 10:40 AM

### [O24-03] Multi-Scale Integrated Crop Growth Monitoring and Diagnosis for Smart Farming

(Invited Speaker)

○Tao Cheng, Xia Yao, Yongchao Tian, Xiaojun Liu, Qiang Cao, Jun Ni, Xiaohu Zhang, Yan Zhu, Weixing Cao (National Engineering & Technology Center for Information Agriculture (NETCIA), Nanjing Agricultural University, China)

Smart agriculture (SA) is a major trend in global agricultural development and major economies have released SA roadmaps or development strategies for the next decade. In particular, smart farming has emerged from the integration of crop cultivation and information technologies and has received widespread attention in the new era of Agriculture 4.0. This talk presents our recent advances in the monitoring and diagnosis of winter wheat and rice growth with canopy, drone and satellite data within the context of smart farming. At canopy level, we developed novel approaches with ground-based imaging or non-imaging data and have made significant progress in reducing background effects for improved leaf nitrogen concentration or chlorophyll content. Given the advent of drones, we have established various methods to combine multi-source information (e.g., spectral, textural, structural) from unmanned aerial vehicle (UAV) imagery for accurate estimation of crop biomass and nitrogen uptake. With satellite imagery, we have developed practical field boundary delineation and crop mapping methods for efficient field-based precision management across farms or even larger areas. These crop monitoring technologies have been integrated with growth diagnosis algorithms to make nitrogen topdressing recommendations for green agriculture. The smart farming technologies have been applied across major rice and winter wheat production regions in China, which have helped farmers to improve resource use efficiency and increase grain yield. The applied research and co-operative extension activities have led to significant effects in promoting the awareness of smart farming in local crop production and advancing the digital transformation of agricultural development.