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Detecting Nutrient Deficiency of Rice with Multiple Spectral Drone Images

Ji-Hyeon Lee[1], Hyeokjin Bak[1], Dongwon Kwon[1], Woojin Im[1], Wan-Gyu Sang[1], Jung-Il Cho[1], Sungyul Chang[1]

[1]Crop Physiology and Production, National Institute of Crop Science, Rural Development Administration, 181, Wanju 55365, Republic of Korea

[Introduction]

Diagnostic health of plant was considered one of the most important information to check for crop development but measuring health of plant was difficult task during growing seasons because plant needed to destruct for diagnostic plant. Recently, measuring health of a plant based on image analysis showed promising results. Therefore, detect health of plant with phenomics approaches are needed to developed for diagnostic plant of rice in a paddy field.

[Materials and Methods]

The field removed one or all fertilizer element such as nitrogen (N), phosphorous (P), potassium (K). A drone (DJI. Phantom4 Multispectral Drone) equipped with multiple spectral camera images were acquired at experimental rice paddy field station (Mil-yang, Gyeonsangnam-do) five times in during growing season. Total thirteen health related index that including NDVI extract from the drone images and comparing different index for separate each treatment.

[Result and Discussion]

The data analysis indicated that robust relationship between health related indexes and treatment of different essential nutrient elements (N,P,K). The correlation between the spectral derived indexes and different combination of showed significant result ($R^2 = 0.8$). In time series analysis, relationship between the indexes and the treatment showed higher correlation ($R^2 = 0.91$). The result indicated that the indexes could utilized estimating nutrient deficiency of rice without scarifies plants. Later, it might be worth to investigate whether this indexes could apply to detect nutrient deficiency of rice at different paddy fields.

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*Corresponding author: E-mail. schang8@korea.kr Tel. +82-63-238-5279