

## Research on yield estimation according to nitrogen fertilization amount of Chamdongjin rice using drone images

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Advances in digital-based technologies such as drones and sensors have made it possible to acquire high-quality aerial images. In the agricultural field, much research is being conducted using crop data obtained by installing high-end sensors on drones. Recently, it has become possible to estimate yield through crop data acquired by drones. In this study, based on drone images, we aim to estimate early yield according to nitrogen treatment for Chamdongjin rice, which has recently been widely cultivated in Jeollabuk State. Chamdongjin rice was transplanted in a rice cultivation field in Iksan on May 31, 2023. For nitrogen treatment, 6kg/10a of basal fertilizer was applied before transplanting. Afterwards, top dressing fertilizer was applied at levels of 0, 3, and 6kg/10a, respectively. Biomass and yield were investigated according to the rice growth stage. Then, a multispectral sensor (Altum, Micacense Co) was attached to a drone (Matrice 200, DJI Co) to acquire multispectral and RGB images. The images were matched with FIX4DMapper and the vegetation index was extracted using the QGIS program. As a result of correlation analysis between rice growth information surveyed on the ground and vegetation index data from drone images, it was confirmed that similar trends were shown depending on nitrogen treatment. As a result of investigating the yield according to the nitrogen fertilization amount of rice, the yield was 614, 632, and 682kg/10a as the nitrogen fertilization amount increased to 6, 9, and 12kg/10a, respectively. As a result of analyzing drone video images, NDRE was found to have a higher correlation than NDVI and GNDVI, which is more advantageous for estimating harvest yield. As a result of regression analysis of the NDRE vegetation index and yield, the coefficient of determination (R<sup>2</sup>) showed a high correlation with a maximum of 0.83. Based on the test results, it is believed that it will be possible to estimate rice yield by nutritional status for Chamdongjin rice using drone images.