

Research on crop estimates of major rice varieties in Jeonbuk State based on remote sensing

Yeong-Ho Kang^{1*} Young-Seok Yu¹ Hyo-Jin Kim
Yu-Na Choi¹ Dae-Ho Jo¹ Seung-Hwa Yu² Chun-Gu Lee² Min-Sil An¹

¹Jeonbuk State Agricultural Research and Extension Services, Iksan, Korea

²National Institute of Agricultural Sciences, RDA, Jeonju, Korea

e-mail:dudgh0414@korea.kr

In Korea, where rice is the staple food, a wide variety of rice varieties are grown depending on the region. Jeonbuk State annually surveys the crop conditions of major rice varieties grown in the region and creates a database. However, existing survey methods have the disadvantage of requiring a lot of labor and producing relatively little sample data. Recently, the development of drone-based observation technology has made it possible to acquire precise data of less than 10 cm, making it possible to acquire crop growth data. This study analyzed the correlation between the rice vegetation index of drone images and ground survey data to estimate crop conditions for major rice varieties in Jeonbuk State through drone images. The main rice varieties of Jeonbuk State, Sindongjin, Chamdongjin, Nampyeong, Yechan, and Saenuri, were transplanted at the test research field in Iksan. Biomass was examined on the ground according to the rice growth stage. At the same time, a multispectral sensor (Altum, Micacense Co) was attached to a drone (Matrice 200, DJI Co) to acquire multispectral and RGB images. The acquired images were matched using FIX4DMapper and the vegetation index was calculated for each location information using QGIS. As a result of the biomass growth review results of Sindongjin, Chamdongjin, Nampyeong, Yechan, and Saenuri, the average soy sauce, hard water, and dry weight were 78cm, 21cm, and 39g/hill. The average yield was 543kg/10a. As a result of analyzing drone images for each rice growth stage, NDRE was found to be more advantageous than NDVI and GNVDI for estimating crop conditions. In the early stages of rice growth, the average NDRE was 0.45 and increased to 0.67 during the planting period, but gradually decreased after planting and tended to decrease to 0.38. As a result of regression analysis between the NDRE of time series data collected through drone video and the rice biomass and yield surveyed on the ground, a high correlation was shown with a coefficient of determination (R²) of up to 0.92. It is expected that the growth and yield of each rice variety can be estimated based on drone images through the construction of an advanced database over many years.