REMOTE MEASUREMENT OF ABOVEGROUND BIOMASS, PLANT HEIGHT AND LEAF MOISTURE IN RICE (*ORYZA SATIVA* L.) USING SENTINEL-2 SATELLITE IMAGERY

M.L.M.A. Liyanage[1*#], A.S.A. Salgadoe[1], P.P. Dharmaratne[1], and R.A. Crabbe[2]

[1]*Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka, Makandura, Gonawila. Sri Lanka*
[2]*Research Institute for the Environment and Livelihoods, Charles Darwin University, Darwin, Australia*
*Correspondence E-mail: madhushianu111@gmail.com, Phone: +94711141430
#Presenting Author

Abstract: Rice (*Oryza sativa* L.) is a staple crop in Asian countries. Plant parameters, such as above-ground biomass, leaf moisture and plant height are important indicators in rice crop monitoring. The objective of this study was to test the correlation between ground truth data and remotely sensed satellite data. The experiment was done at rice farmer-field at Gampaha, Sri Lanka cultivated with Bg 374 variety. Crop measurements were collected from five quadrant samples per single satellite pixel across the field. This was repeated in two growth stages, panicle initiation and booting stage. The satellite images with 10 m x 10 m resolution were downloaded using Google Earth Engine platform. The sample quadrant locations were labelled by an RTK-enabled drone flown over the field before data collection. The zonal statistics tool of QGIS software was used to extract waveband data from corresponding satellite pixels and used to compute vegetative indices (VIs). Regression analysis results showed best relationship with AGB Soil Adjusted Vegetation Index (SAVI: $R^2=0.48$) in panicle initiation stage and Green Vegetation Index (GVI: $R^2=0.46$) in booting stage. The Greenness Index (GI: $R^2=0.20$) exhibited the best relationship with leaf moisture in panicle initiation stage and Normalized Difference Vegetation Index (NDVI: $R^2=0.93$) in booting stage. For plant height (Float disc method), Ratio Vegetation Index (RVI) exhibited the best relationship both in panicle initiation ($R^2=0.19$) and in booting stage ($R^2=0.26$). The findings could be of future use for advanced remote sensing techniques in monitoring rice crops for smart agriculture.

Keywords: Booting stage; Ground truth data; Panicle initiation stage; Satellite imagery; Vegetation indices