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## A NOVEL SATELLITE-BASED METHODOLOGY FOR RETRIEVING SPECIFIC LEAF AREA OF RICE (HASHEMI CULTIVAR) AT FIELD SCALE

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### Abstract

Specific leaf area (SLA), determines the physiological cost of producing leaf area. Specific leaf area (SLA) is an important parameter for plant growth modelers because it determines how much new leaf area to deploy for each unit of biomass produced. Since direct measurement of SLA in the field is time-consuming and costly, this study introduces a novel satellite-based methodology for estimation of rice SLA from Sentinel 2A satellite images. To estimate the SLA, an experiment was conducted in a paddy field located in the Rice Research Institute of Iran. Detailed data on soil, water atmosphere and plant were collected under growth period of 2018. Sentinel 2A satellite images for the dates closed to the field sampling were downloaded and SLA data over the paddy field were derived using localized and general multi-variables regression equations based on biophysical vegetation indices. The evaluation of results at different growth stages showed that, in the vegetative stage, the NDVI ( $R^2 = 0.98$ ) had a better linear relationship with the LAI, but in the later growth stages, SAVI with determination coefficients of 0.99 and 0.93 provided a better linear relationship with the LAI at reproductive and ripening stages, respectively. Moreover, the results showed that SLA can be estimated for the entire rice growth period with high accuracy ( $R^2 = 0.70$ ), using exponential localized equations based on leaf dry matter and LAI. The results confirmed significant increase in the accuracy of SWAP yield output in case of data assimilation using satellite-based SLA.

*Key words:* leaf area index, NDVI, remote sensing, rice, SAVI

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