Evaluation of Sentinel-2 Satellite Data for Groundnut Yield Estimation in Malawi

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Satellite data have proven useful low-cost yield estimation in many crops and regions, but have not yet been rigorously tested in groundnut systems. We describe a study to evaluate the utility of Sentinel-2 satellite data, which acquires ~weekly optical images at 10m resolution, for yield prediction. Field boundaries were outlined for 330 groundnut fields during the 2021 growing season in Malawi and yields on these fields were measured with a crop-cut from a central part of the field. Multi-date Sentinel-2 data were processed to remove clouds and harmonic regression was used to estimate canopy greenness throughout the season. The peak greenness was found to exhibit significant positive correlation with yield, consistent with prior work in other crops in the region. However, substantial noise in the ground measures precluded a precise estimate of satellite performance. We recommend that future field work aim to acquire 2-3 crop cuts at random locations per field, even if fewer total fields are covered, to enable more precise evaluation of Sentinel-2 yield estimates. In addition, measuring weed coverage and total groundnut biomass for a subset of fields would help to better understand sources of error and improve future estimates.