The Table S1 indicate that seasonal maximum VIs from Sentinel-2 can estimate yield better than mean and median VIs, and interpolated VIs which aim to minimise cloud effect do not necessarily improve yield estimation accuracy compared to the original (i.e. non-interpolated) value.

Table. S1 Accuracy assessment (R2 and RMSE) of linear regression models between Sentinel-2 VIs calculated based on temporal aggregation methods (seasonal maximum, mean, median from original VIs value and interpolated (fitted) one) and yield. SD represents the standard deviation of performance metrics computed from the 500-fold cross-validation. The VIs is ordered based on RMSE and R^2.

VIs	RMSE	nRMSE	R^2	RMSE_SD	R^2_SD
CIgreen_max_10m	1.477	19.91%	0.516	0.370	0.225
CIgreen_mean_10m	1.628	21.94%	0.425	0.371	0.230
CIgreen_median_10m	1.802	24.29%	0.318	0.400	0.255
CIgreen_max_fitted_10m	1.520	20.49%	0.500	0.341	0.219
CIgreen_mean_fitted_10m	1.561	21.03%	0.477	0.381	0.230
CIgreen_median_fitted_10m	1.656	22.32%	0.419	0.338	0.226
CIred_max_10m	1.483	19.99%	0.546	0.333	0.204
CIred_max_fitted_10m	1.481	19.97%	0.534	0.314	0.207
CIred_mean_10m	1.525	20.56%	0.508	0.331	0.213
CIred_mean_fitted_10m	1.475	19.88%	0.547	0.325	0.202
CIred_median_10m	1.885	25.41%	0.249	0.350	0.227
CIred_median_fitted_10m	1.626	21.92%	0.424	0.344	0.237
EVI_max_10m	1.771	23.87%	0.319	0.348	0.219
EVI_max_fitted_10m	1.703	22.95%	0.378	0.334	0.231
EVI_mean_10m	1.691	22.79%	0.377	0.332	0.227
EVI_mean_fitted_10m	1.667	22.46%	0.396	0.338	0.226
EVI_median_10m	1.779	23.98%	0.312	0.351	0.242
EVI_median_fitted_10m	1.753	23.62%	0.343	0.295	0.226
MCARI/OSAVI_max_10m	2.017	27.18%	0.256	0.362	0.237
MCARI/OSAVI_max_fitted_10m	1.924	25.92%	0.316	0.470	0.244
MCARI/OSAVI_mean_10m	1.692	22.80%	0.363	0.365	0.233
MCARI/OSAVI_mean_fitted_10m	1.730	23.32%	0.351	0.407	0.243
MCARI/OSAVI_median_10m	1.771	23.86%	0.324	0.366	0.247
MCARI/OSAVI _median_fitted_10m	1.796	24.21%	0.309	0.303	0.226

Table S1 continued. Accuracy assessment (R^2 and RMSE) of linear regression models between Sentinel-2 VIs and yield.

VIs	RMSE	nRMSE	R^2	RMSE_SD	R^2_SD
MSAVI_max_10m	1.693	22.82%	0.378	0.349	0.228
MSAVI_max_fitted_10m	1.713	23.08%	0.369	0.327	0.227
MSAVI_mean_10m	1.705	22.98%	0.364	0.330	0.220
MSAVI_mean_fitted_10m	1.673	22.55%	0.393	0.337	0.220
MSAVI_median_10m	1.775	23.93%	0.302	0.344	0.232
MSAVI_median_fitted_10m	1.752	23.61%	0.350	0.303	0.226
MTCI_max_10m	2.017	27.18%	0.378	0.530	0.276
MTCI_max_fitted_10m	1.868	25.18%	0.462	0.743	0.267
MTCI_mean_10m	1.604	21.61%	0.452	0.449	0.264
MTCI_mean_fitted_10m	1.932	26.03%	0.371	0.565	0.285
MTCI_median_10m	1.663	22.41%	0.436	0.434	0.261
MTCI_median_fitted_10m	1.971	26.56%	0.339	0.506	0.272
NDVI_max_10m	1.533	20.66%	0.484	0.332	0.214
NDVI_max_fitted_10m	1.727	23.27%	0.328	0.331	0.229
NDVI_mean_10m	1.652	22.26%	0.414	0.322	0.218
NDVI_mean_fitted_10m	1.581	21.31%	0.464	0.321	0.207
NDVI_median_10m	1.929	26.00%	0.201	0.328	0.203
NDVI_median_fitted_10m	1.792	24.15%	0.299	0.324	0.234
OSAVI_max_10m	1.618	21.81%	0.433	0.338	0.224
OSAVI_max_fitted_10m	1.721	23.20%	0.352	0.329	0.222
OSAVI_mean_10m	1.678	22.62%	0.395	0.326	0.218
OSAVI_mean_fitted_10m	1.629	21.96%	0.431	0.325	0.215
OSAVI_median_10m	1.848	24.90%	0.250	0.342	0.223
OSAVI_median_fitted_10m	1.772	23.88%	0.328	0.304	0.226
SAVI_max_10m	1.696	22.86%	0.375	0.343	0.226
SAVI_max_fitted_10m	1.727	23.28%	0.356	0.324	0.221
SAVI_mean_10m	1.704	22.97%	0.367	0.330	0.223
SAVI_mean_fitted_10m	1.669	22.50%	0.394	0.335	0.221
SAVI_median_10m	1.784	24.05%	0.291	0.340	0.229
SAVI_median_fitted_10m	1.757	23.68%	0.343	0.300	0.221
TCARI/OSAVI_max_10m	1.932	26.04%	0.185	0.309	0.169
TCARI/OSAVI_max_fitted_10m	1.928	25.99%	0.210	0.303	0.196
TCARI/OSAVI_mean_10m	1.894	25.52%	0.244	0.362	0.218
TCARI/OSAVI_mean_fitted_10m	1.953	26.32%	0.211	0.371	0.202
TCARI/OSAVI_median_10m	2.004	27.01%	0.164	0.295	0.185
TCARI/OSAVI_median_fitted_10m	1.982	26.71%	0.162	0.300	0.184

Table S1 continued. Accuracy assessment (R^2 and RMSE) of linear regression models between Sentinel-2 VIs calculated based on temporal aggregation methods (seasonal maximum, mean, median from original VIs value and interpolated (fitted) value) and yield. The VIs is ordered based on RMSE and R^2.

VIs	RMSE	nRMSE	R^2	RMSE_SD	R^2_SD
TVI_max_10m	1.790	24.12%	0.301	0.345	0.215
TVI_max_fitted_10m	1.752	23.61%	0.332	0.332	0.224
TVI_mean_10m	1.717	23.14%	0.354	0.333	0.225
TVI_mean_fitted_10m	1.699	22.89%	0.372	0.340	0.225
TVI_median_10m	1.760	23.72%	0.321	0.348	0.246
TVI_median_fitted_10m	1.777	23.95%	0.317	0.302	0.222

Table S2 Accuracy assessment (R^2 and RMSE) of linear regression models between PlanetScope VIs calculated based on temporal aggregation methods (seasonal maximum, mean, median from original VIs value) and yield. SD represents the standard deviation of performance metrics computed from the 500-fold cross-validation. The VIs is ordered based on RMSE and R^2.

PlanetScope_VIS	RMSE	nRMSE	R^2	RMSE_SD	R^2_SD
EVImax_3m	1.48	19.95%	0.52	0.35	0.21
EVImean_3m	1.63	21.97%	0.42	0.41	0.25
EVImedian_3m	1.90	25.61%	0.22	0.36	0.21
MSAVImax_3m	1.53	20.62%	0.49	0.37	0.21
MSAVImean_3m	1.64	22.10%	0.41	0.40	0.25
MSAVImedian_3m	1.85	24.93%	0.28	0.39	0.23
NDVImax_3m	1.57	21.16%	0.48	0.35	0.21
NDVImean_3m	1.50	20.22%	0.51	0.39	0.23
NDVImedian_3m	1.55	20.89%	0.47	0.37	0.23
SAVImax_3m	1.53	20.62%	0.49	0.37	0.21
SAVImean_3m	1.64	22.10%	0.41	0.40	0.24
SAVImedian_3m	1.83	24.66%	0.29	0.39	0.23

Table S3 Accuracy assessment (R^2 and RMSE) of linear regression models between Sentinel-2 retrieved LAI calculated based on temporal aggregation methods (seasonal maximum, mean, median from original VIs value and interpolated (fitted) one) and yield. SD represents the standard deviation of performance metrics computed from the 500-fold cross-validation. The VIs is ordered based on RMSE and R^2.

LAI	RMSE	nRMSE	R^2	RMSE_SD	R^2_SD
SL2P LAI_max	1.56	21.02%	0.49	0.34	0.21
SL2P LAI_fitted_max	1.56	21.02%	0.48	0.34	0.21
SL2P LAI_mean	1.76	23.72%	0.32	0.37	0.25
SL2P LAI_fitted_mean	1.94	26.15%	0.21	0.32	0.22
SL2P LAI_median	1.90	25.61%	0.24	0.30	0.24
SL2P LAI_fitted_median	1.94	26.15%	0.17	0.30	0.17

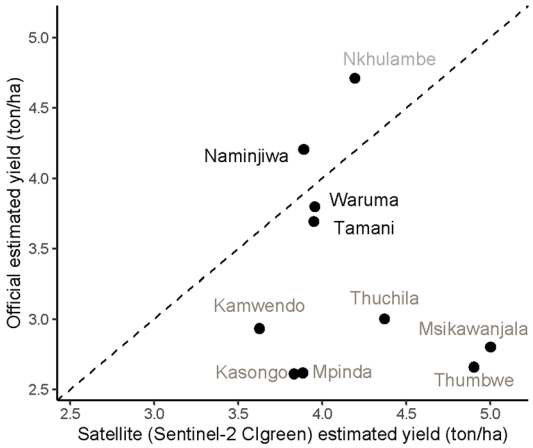

Figure S1 Comparison between official yield and estimated yield based on Sentinel-2 CIgreen. The figure indicates that two estimates agree better for EPAs (Naminjiwa, Waruma, Tamani) where field data were collected for model calibration. Bigger disparities exist for EPAs outside of the calibration region, especially for Miskawanjala EPA, Kamwendo and Thuchila EPAs.

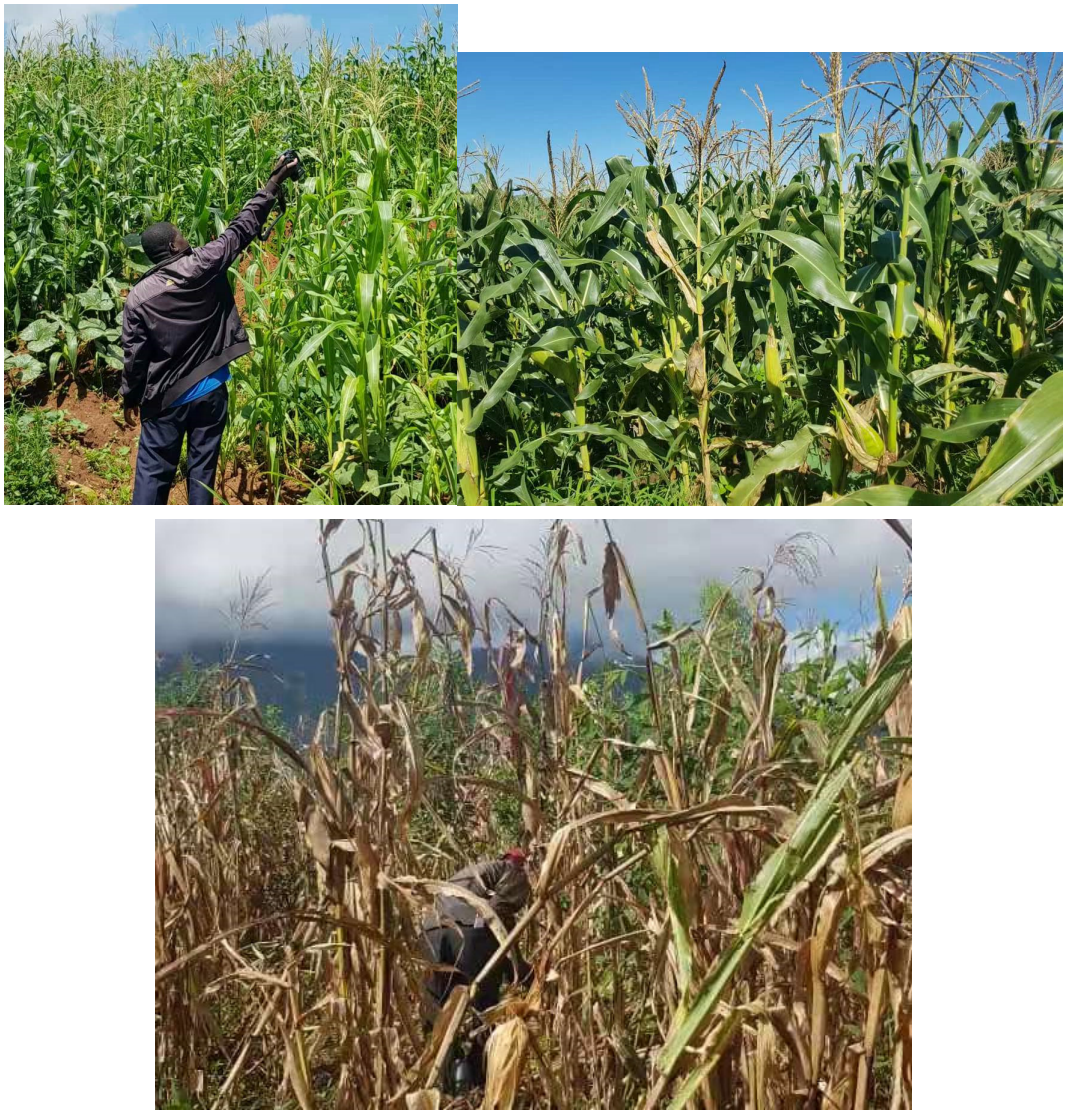

Figure S2 Field photos showing maize-legume intercropped plots at peak growing season (top) and harvesting stage (bottom).