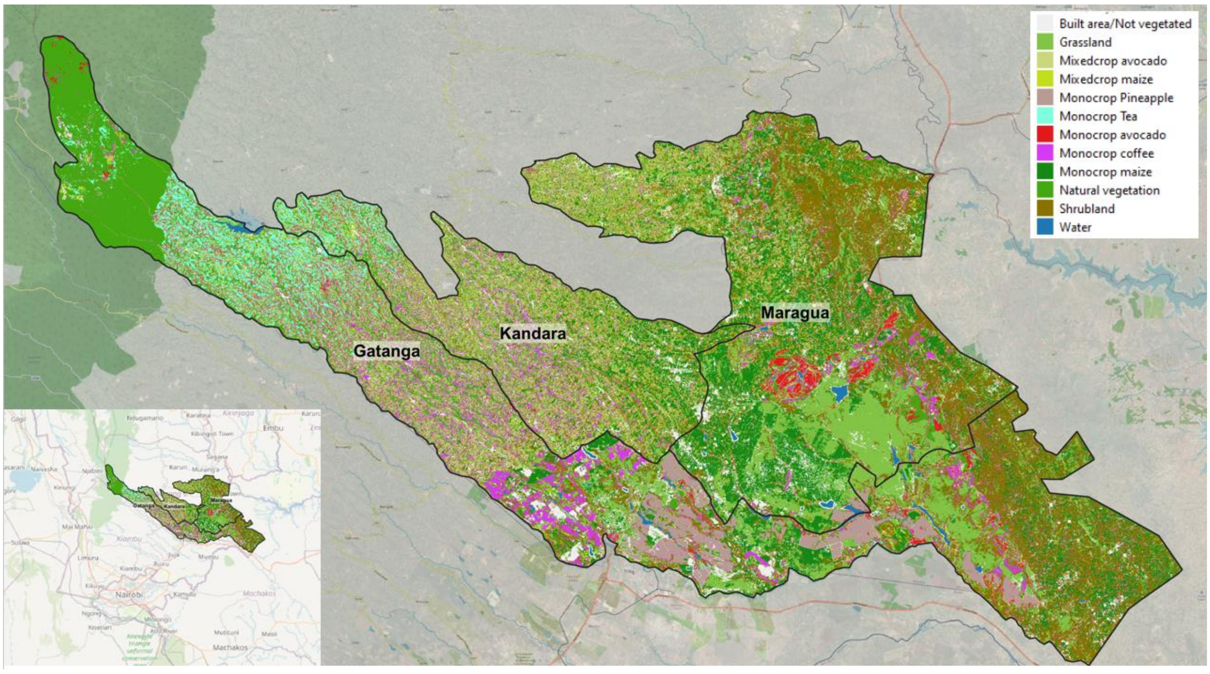
Crop Type and Acreage Mapping



1-year Crop Type map in Kenya based on monthly products from Sentinel1&2 (Source: GMV).

Product Category

■ Land Use ☐ Natural Disaster ☐ Coast Management ☐ Earth's Surface Motion

☐ Land Cover ☐ Climate Change ☐ Marine

Financial Domain(s)

■ **Investment management** ☐ **Risk analysis** ■ **Insurance management** ■ **Green finance**

User requirements

UN18: Need to monitor crop productivity.
UN19: Identifying types of crops being grown is essential.
UN28: Need to classify the types of crops being grown in order to assess the sustainability and environmental impact of agricultural investments.
UN29: Need to accurately measure the planted area for crops.

Description

Crop type and acreage mapping play a crucial role in monitoring agricultural land use and making estimations of crop production. These maps provide detailed information about the agricultural species present in a specific area, including their extent, and growth stage at a particular point in time. Satellite images capture detailed data about agricultural areas, allowing for the identification and classification of different crops based on their spectral characteristics. By leveraging advanced image processing algorithms and machine learning models, crop types can be accurately determined.

Spatial Coverage Target

Individual farm level

Data Throughput

Rapid tasking	☐ High	■ Low
Data availability	☐ High	■ Low

Product specifications	
Main processing steps	Before creating crop type and acreage maps, the initial step involves mapping the location of crops. This process utilizes machine learning-

Product specifications	
	based classification models, incorporating inputs from various Earth Observation (EO) data sources such as vegetation and backscatter indices. In addition to EO data, non-EO data like local in-situ data and land use land cover maps are also incorporated. The resulting crop location maps are then combined with vegetation and backscatter indices, Digital Surface Models, existing crop type maps like ESA WorldCereal, and ground truth data. These combined inputs are then fed into machine learning models for the classification of different crop types.
Input data sources	Optical: Sentinel-2, VHR based on the availability like Pleiades 1A/1B & NEO, WorldView2&3, and SPOT6/7 Radar: Sentinel-1 Supporting data: In-situ crop type data, ESA's WorldCover layer, ESA WorldCereal, ALOS Global Digital Surface Model
Accessibility	Sentinel-1&2: freely and publicly available from ESA. Optical VHR imagery: commercially available on demand from EO service providers.
Spatial resolution	Sentinel-2: 10 m Optical VHR: ≤ 1 m Sentinel-1: 20 m
Frequency (Temporal resolution)	Sentinel-2: 6 days Optical VHR: Sub-daily to Daily Sentinel-1: 6 days
Latency	< 1 Day
Geographical scale coverage	Globally
Delivery/ output format	Data type: Raster, Vector File format: GeoTIFF, Shapefile
Accuracies	Thematic accuracy: 80-90% Spatial accuracy: 1.5-2 pixels of input data
Constraints and limitations	▪ The lack of local in-situ data ▪ Cloud presence ▪ Differentiating between certain crop types with similar spectral signatures can be challenging. Field heterogeneity with different crop types intermixed or crop rotations occurring within the same area.
User's level of knowledge and skills to extract information and perform further analysis on the EO products.	Skills: Essential Knowledge: Essential

Crop Phenology, Rotation, and Number of Seasons