Remote Sensing in Crop Monitoring across North Africa: A Focus on Kenya's Agricultural Landscape

Otombo Ngugi[1]

[1] Kenya Medical Research Institute (KEMRI)

Correspondence: ongugi@yahoo.com

Author notes

Otombo Ngugi is affiliated with Kenya Medical Research Institute (KEMRI) and focuses on Agriculture research in Africa.

Abstract

Remote sensing technologies have been increasingly applied in agriculture for monitoring crop health and productivity across various regions of North Africa, including Kenya's diverse agricultural landscapes. Remote sensing data from Landsat satellites were used to analyse vegetation indices such as Normalised Difference Vegetation Index (NDVI) to monitor crop health. Machine learning models, specifically Random Forest regression, were employed to predict yield variability across different farming practices and environmental conditions. A significant proportion of the variance in NDVI readings was explained by machine learning algorithms, indicating their potential for early detection of crop stress and adaptive management strategies. The study demonstrates the feasibility of using remote sensing data combined with machine learning models to enhance agricultural monitoring and yield prediction in northwestern Kenya. Further research should focus on integrating diverse datasets and incorporating more sophisticated machine learning techniques to improve predictive accuracy and reliability. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenya, Remote Sensing, GIS, Precision Agriculture, Image Analysis, Crop Health Monitoring, Geospatial Technology*

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