



Remote Sensing Data Integration for Crop Yield Prediction in Madagascar Rice Paddies: Accuracy and Application Timelines

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Abstract

Remote sensing data integration is increasingly used for crop yield prediction in agricultural settings, particularly in developing countries like Madagascar where traditional methods are limited. A systematic search was conducted across multiple databases focusing on studies that utilised remote sensing for crop yield prediction, with an emphasis on Madagascar's environment and climate conditions. Remote sensing data integration significantly improved yield predictions by up to 20% in comparison to traditional methods. Application timelines varied based on sensor type and environmental factors. The review underscores the potential of remote sensing for enhancing agricultural productivity, especially in Madagascar's diverse rice paddies. Further research should explore integrating machine learning models with remote sensing data for more accurate yield predictions. Model estimation used $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \theta \} \operatorname{sumiell} (y_i, f\theta(\xi)) + \lambda l \operatorname{Vert}\theta r \operatorname{Vert} 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Remote sensing, GIS, GPS, precision agriculture, crop modelling, geographic information systems, agricultural technology*

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