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DEVELOPMENT OF YIELD PREDICTION MODELS IN THE MAIZE CROP USING SPECTRAL DATA FOR PRECISION AGRICULTURE APPLICATIONS

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Abstract
Yield estimation for the maize crop (*Zea mays L.*) is required in Ecuador for decision making on imports and commercialization. In the literature many yield predictive models have been developed for different crops, but they need to be adapted to the local conditions. In this study, machine learning techniques and statistical tools such as simple, logistic and polynomial regression were applied in order to develop yield predictive algorithms. Spectral information was gathered from 119 farms monitored across the four traditionally maize producing provinces of Ecuador, Guayas, Loja, Manabí and Los Ríos. Spectroradiometer readings were collected at two crop development stages; full leaf development and the beginning of tassel emergence. A model using six degree polynomial regression delivered the best yield predictive capability under Ecuadorian conditions. This model should be evaluated in future years and locations in order to be fine-tuned with out-of-sample testing. After validation, this model could be recommended for decision making on imports strategies in order to avoid overlapping with the national production. This tool can also offer an early warning of the sites requiring technical assistance and practices to improve yield. Further model improvement could be achieved by including variables such as climatic conditions, agricultural practices and soil characteristics. Future models may also be developed for other crops of importance.

Keywords: machine learning, NDVI, proximal sensing, remote sensing, regression.

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