



Doctoral Thesis Title: Studies on the use of multispectral satellite and UAV images for the estimation of crop variables and agricultural productivity in herbaceous crops in the Lambayeque region, Peru.

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Abstract:

The application of remote sensing techniques using medium- and high-resolution multispectral satellite imagery (Landsat or Sentinel-2) is a major advance in agriculture, both for the creation and updating of agricultural inventories and for yield prediction and land management (Ruiz et al., 2020). However, improvements in Unmanned Aerial Vehicles (UAV) on-board sensors and remote sensing methods have given the ability to observe in detail and identify stress and evapotranspiration (ET) at the plant level by different energy balance methods (Mokhtari et al., 2021), in addition to monitoring and predicting crop conditions by rapid, non-destructive analysis (Choudhury et al., 2021; Hasan et al., 2019). Therefore, they allow compensating satellite information in periods of time or in the presence of high cloud cover (Ojeda et al., 2017). However, there are few studies conducted with multispectral satellite and UAV images jointly, particularly in herbaceous crops in the Lambayeque region, northern Peru. Therefore, the general objective of the project is to evaluate the estimation of crop variables and yield of herbaceous crops from vegetation indices obtained from multispectral satellite and UAV images; being the specific objectives: (i) Characterize and estimate vegetation indices associated with the yield potential of herbaceous crops using multispectral satellite and UAV images, (ii) Determine the relationship between vegetation indices and productivity of herbaceous crops from optimization techniques using machine learning, (iii) Estimate evapotranspiration and temporal production of herbaceous crops in the Lambayeque region, detecting moments of water stress. This information will contribute to planning, development, sustainability and decision making in the hydro-agricultural sector of the Lambayeque region, Peru.

Available Means:

The thesis plan will be carried out in the context of the research project "Improvement of water management in rice fields of Peruvian rural producers using drones and satellites in the context of climate change" with funding from the Spanish Agency for International Development Cooperation (AECID) and collaboration with the research group of the Experimental Irrigation Area (EAR) of the National Agrarian University La Molina (UNALM). Principal Investigator: Luis Ángel Ruiz Fernández.

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