CONTRIBUTION OF PRECISION AGRICULTURE ON ASSESSING THE SPATIAL VARIABILITY OF YIELD AND QUALITY IN A COMMERCIAL WHEAT FIELD

by

Rodrigues Jr., F.A.[1]; Ortiz-Monasterio, I.[1]; Zarco-Tejada, P.J.[2]; Gérard, B.[1]

[1] International Maize and Wheat Improvement Center - CIMMYT, Texcoco, Mexico.
F.A.Rodrigues@cgiar.org
[2] Instituto de Agricultura Sostenible (IAS), Consejo Superior de Investigaciones Científicas (CSIC), Cordoba, Spain.

The agricultural research sector is working to develop new technologies and management knowledge to sustainably increase food productivity, to ensure global food security and decrease poverty. Wheat is one of the most important crops into this scenario, being between the two most important cereal commodities produced worldwide. Precision Agriculture (PA) and Remote Sensing (RS) technologies can contribute to increase wheat yield and quality sustainably. For this reason, CIMMYT's research agenda aims at developing new crop management practices using PA technologies. As part of these efforts, an experiment has been established on a wheat farm's field in the Yaqui Valley, in northwestern Mexico, sowed on January 2014. Our hypothesis is that it is possible to assess the key factors affecting wheat yield and quality variability, aiming to detect the correctable and uncorrectable main factors. We are also exploring the potential for wheat growers and processors to adopt a selective harvesting strategy based on grain protein content, extracting greater value from the raw product. Prior to sowing we carried out a high resolution soil survey using an electromagnetic induction sensor – EM38, mounted in a wood sled and tractor dragged through the field; followed by a targeted soil sampling at two depths (0-0.3 and 0.3-0.6 m) for physical and chemical soil properties analysis. A weekly flight campaign took place from GS31 stage until harvest, using high resolution airborne hyperspectral and thermal imaging sensors flying at 600 m above ground, with ground resolution of 0.5 m (hyperspectral) and 0.75 m (thermal). Yield and quality monitoring will take place during harvest. We expect to assess the spatial variability of yield and quality using the proximal and remote high resolution data, exploring the possibility of a logistic strategy for selective harvesting; exploring also the use of those data for a better crop management.