Multispectral UAV-based monitoring of behavior of different wheat and barley varieties

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**Abstract.** Multispectral (MS) remote sensing (RS) is a powerful tool for crops monitoring in precision agriculture (PA) framework. Due to the high accuracy level requested in this application, unmanned aerial vehicles (UAVs) are the most suitable choice for MS surveys. UAVs allow monitoring crops obtaining data in very high resolution (VHR) and the possibility to have daily-based surveys.

Cereals are the most widely cultivated species in the Mediterranean environment, supporting food chains for bread and pasta as well as livestock production. In these agroecosystems, the development of precision farming techniques is essential to make production more efficient and sustainable, also in order to secure supplies despite volatile food commodity prices characteristic of this post-Covid19 period.

The main object of this study was monitoring the behaviour of different wheat and barley varieties, taking into account their spectral aspects and in situ measurements of plant height and biomass nitrogen concentration. For this purpose, a field experiment, laid out as a completely randomized block design with three replications for wheat and four for barley, was conducted in San Marco Argentano (CS, Calabria - Italy). In particular, the spectral response of thirty wheat and nineteen barley varieties was compared during different stages of plant growth. UAV surveys were conducted by DJI Phantom 4 Multispectral equipped with a 6 bands sensor (RGB, Blue, Green, Red, RedEdge and NIR), obtaining vigour maps. Different vegetation indices (VIs) were tested to monitor differences between varieties after a geographical object-based image classification (GEOBIA).

This work presents the preliminary methodological tests and results of a still ongoing field monitoring.