Evaluation of different flight courses with UAV in vineyard

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**Abstract.**

Precision farming has consolidated the use of Unmanned Aerial Vehicles (UAVs), which have confirmed their role as excellent tools for data acquisition and analysis. These systems have wide operational flexibility, good flight autonomy and excellent spatial resolution of multispectral images, these prove to be more competitive in data acquisition than satellite systems, especially on small areas typical of Italian viticulture. Unfortunately, low know in literature about the flight course influence the extraction spectral and biometric information of canopy. For this reason, the aim of this work is to compare the different flight directions that can be performed with UAVs, to assess the differences in the acquisition of the spectral response of vineyard canopy and biometric characteristics. The vineyard is located in Camporeale, (Sicily, Italy); with only one typical cultivar (Catarratto). The surface area of the experimentation field is 8 ha. The distance between the vines is 2.2 by 1m. The vineyard has a rows orientation of NE-SW and the field presents two different orographic area. In specific, one of this area is flat and the other is hillside with medium-hight slope. Remote images were acquired with a multi-rotor UAV, equipped with a camera with six multispectral bands, one RGB for visible light images and five monochrome narrow bands for multispectral image. A sensor has a field of view (FOV) of 62,7°, and downwards of 90° was used. The over-lap in front and side were 70%. Two flight courses were carried out, one direction was perpendicular and the other was parallel to the orientation of rows. The flight has done with a perfect weather; condition without wind. The results show there are difference in the reconstructions image that induction a variability in multispectral data and biometric parameters in the plants.