Using a UAV-mounted multispectral camera for assessing spatial variability in vineyard

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**Abstract.**

Accurate, timely and non-destructive forecasting of vineyard production on a field scale is essential to achieve a good production and quality outcome. Remote sensing may be an effective and practical monitoring tool, as data from on-board of Unmanned Aerial Vehicles (UAVs) sensors can measure vegetative and reproductive growth, and thus directly or indirectly detect variability in quality parameters. The objective of this study was to assess the variability of a wine grape vineyard located in southern Italy, using a multirotor UAV equipped with a near-infrared sensitive digital camera. The data were collected in the 2021 growing season, the flight mission was carried out one week before harvest (September). At harvest, the yield per plant [kg] (N=84) and the average weight of the bunches [g] were recorded. Laboratory analyses were carried out on the musts obtained in order to assess some technological parameters (Brix°; Total Acidity [g/l]). Normalized difference vegetation index (NDVI) and green normalized difference vegetation index (GNDVI) were calculated to find the best correlation with production and quality parameters, using orthomosaic image of UAV. Pearson's correlation coefficient (r) showed a significant and positive correlation between vegetation indices and yield as well as bunch weight, with the strongest relationship observed between GNDVI and yield per plant (r = 0.84; P < 0.01). However, no significant positive correlation was found between the vegetation indices examined and the quality parameters. The results highlighted the applicability of remote sensing to monitor the vine production variability through vegetation indices.