Assessment of vine and cover crop vegetation indices using high-resolution images acquired by UAV platform

Pietro Catania, Massimo Vincenzo Ferro\*, Eliseo Roma, Santo Orlando, Mariangela Vallone

University of Palermo, Department of Agricultural, Food and Forest Sciences, Viale delle Scienze, Ed 4, 90128 Palermo, Italy.

corresponding author \* – phone: +39 9123865608 - E-mail: [massimovincenzo.ferro@unipa.it](mailto:massimovincenzo.ferro@unipa.it)

other authors: [pietro.catania@unipa.it](mailto:pietro.catania@unipa.it); eliseo.roma@unipa.it; [santo.orlando@unipa.it](mailto:santo.orlando@unipa.it); [mariangela.vallone@unipa.it](mailto:mariangela.vallone@unipa.it)

**Keywords.** Precision viticulture; spatial analysis; sustainability, vineyard management

**Abstract.**

In recent years, there has been an increasing need to implement sustainability in agricultural systems, especially for the risks associated with soil degradation. Cover crops are widely recognised and adopted for sustainable vineyard management, reducing soil and water losses, restoring organic matter, and increasing soil fertility. Therefore, it is necessary to determine the biomass development of cover crops using alternative and innovative methods. High-resolution UAV-based multispectral images can be used for this purpose, giving significant information for monitoring the seasonal growth variation of crops. The aim of this research was to study the biomass vigour spatial variability of cover crops and vineyard evaluating the possible correlation between cover crop and vineyard vigour values. Cover crop biomass was monitored by sampling during flowering, measuring fresh weight and dry weight. The vine vegetative growth and yield were measured during the growing season. The multispectral images were obtained with the use of a UAV before the cover crops were buried (March); the spectral response of the vineyard was evaluated with UAV flights during the summer period. The analysis of the vigour maps obtained showed a degree of variability for the vegetation indices examined. This variability was found both on the cover crop biomass development and on the vegetative growth of the vineyard. The results showed the applicability of remote sensing to monitor cover crop and vineyard biomass development, explaining the overall variability of the field. This information allows the application of the appropriate agronomic techniques to improve the quality of the production.