Application of spectral indices for the evaluation of conservative techniques in crops management.

Elio Romano\*1, Federico Calcagno2, Carlo Bisaglia1,

Giampaolo Schillaci2, Sabina Failla2

1CREA Research Centre for Engineering and Agro-Food Processing, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (Council for Agricultural Research and Economics), Via Milano, 43 - 24047 Treviglio (BG) ITALY. Tel. +39/0363/49603. [elio.romano@crea.gov.it](mailto:elio.romano@crea.gov.it)

2Department of Agriculture, Food and Environment (Di3A), Section of Mechanics and Mechanisation, University of Catania, Via Santa Sofia 100, Catania, 95123, Italy

**Keywords.** Sod-seeding, NDVI, NMDI, NDWI, satellites, precision agriculture.

**Abstract.** The common agricultural policies set out in the Green Deal and expressed into the Farm to Fork recommendation document, call all the players in the food supply chain to pay attention to sustainability. The use of not renewable resources and goods for food production must be rationally managed with the aim of their conservation for future generations.

Soil conservative practices, including no-tillage and sod-seedind, reduce energy inputs and prevent the organic matter from exposure to oxidation and loss of moisture; for these reasons, they could represent a solution for crop cultivation not only in water stress conditions.

The satellite image acquisition technology allows to access databases of satellite maps with different spectral indices. Some of these, based on spectrum bands with wavelengths in the near and far infrared zone, are dedicated to the surface water content of crops or soils.

The purpose of this study was to evaluate the trend of two spectral indices: the NMDI (Normalized Multi-band Drought Index), which is dedicated to the evaluation of bare soil and the NDWI (Normalized Difference Water Index) which is used both on crops and soil. Both of them decode the surface moisture.

The NDVI spectral index dedicated to the evaluation of vegetative vigor and to the estimation of the variability in the vegetation cover was observed throughout the cultivation season of the winter cereal.

The analysis were carried out in a land cultivated with durum wheat in Sicily (Italy) and the test conditions included two test-field with different slopes, sown in no-tillage system compared with a test-field sown after conventional tillage.

The results indicated the possibility of the spectral indices to understand the effect of the seeding technique on soil moisture. The use of these indices - available free of charge from ESA (European Space Agency) dataset - allows to have a high-frequency information tool for evaluating the effect of agricultural practices, uniformity of crops and characteristics of the soil; moreover it could provide a greater awareness on the application of management choices dedicated to sustainability.