

<i>Topic</i>	T9.1 Meteorological traceability and uncertainty
<i>Oral or Poster Presentation</i>	Oral/poster

MICROCLIMATE MEASUREMENTS AND CALIBRATED SENSORS IN PROTECTED CULTIVATION

Francesca Sanna^{1,2}, Andrea Merlone², Carmela Anna Migliori³, Maria Annunziata Dipalma³,
Mauro Solomita³, Roberto Deboli¹

¹ *Istituto Macchine Agricole e Movimento Terra - Consiglio Nazionale Ricerche (IMAMOTER-CNR), Turin, Italy*

² *Istituto Nazionale di Ricerca Metrologica (INRiM), Turin, Italy*

³ *Consiglio per la Ricerca in agricoltura e l'analisi dell'Economia Agraria, Centro di ricerca Ingegneria e Trasformazioni agroalimentari (CREA-IT), Turin, Italy*

Corresponding author: francesca.sanna@unito.it

The management of temperature and humidity are the most critical factors in the production of many horticultural cultivated in a protected environment. These parameters affect crop growth, nutrient and water uptake, pollination, fruit ripening and spread of plant diseases. In addition, the relationship between temperature and solar radiation induces considerable and joint effects.

When operating in protected cultivation the amount and the spectral distribution of solar radiation, such as UV, Photosynthetically Active Radiation and IR, inside the cultivation undergoes modifications that depend on the type of cover used. Physiological parameters, such as seed dormancy, gases produced during the germination and in the period immediately after the harvest are affected by meteorological parameters i.e. temperature, solar radiation and precipitation that in turn, affect the variability, quality and productivity of the crop.

Currently, accurate measurements of meteorological parameters related to the cultivation in protected environment are unavailable nor the measurement uncertainties of the environmental parameters that can result in percentage uncertainties on the variability of the product.

An experiment for the measurement of the microclimate in protected cultures and the assessment of the phytochemical characteristics of two tomato cultivars (*Solanum lycopersicum* L.) as a function of the variation of meteorological parameters is briefly presented.

Another object is to evaluate the optical and radiometric properties of the films used as covering material due to their exposure and the deterioration over time, in particular for the film transmissive the UV-B.

The microclimate conditions are monitored by sensors for: solar radiation, operating in the spectral range from 290 nm to 2800 nm; air temperature in the range between -10 °C and 40 °C; relative air humidity from 10 %rh to 98 %rh; inside and outside tunnels with different covering materials. The instruments followed calibration procedures defined ad hoc.

During the growing period of the plants, the leaf area index (LAI) were recorded; after the harvest, other phytochemical characters considered with health promoting compounds, such as ascorbic acid, quantification of polyphenols (Folin-Ciocalteu method) and carotenoids were assessed.

This work presents the preliminary results and the evaluation of the calibration uncertainties of sensors used for monitoring the microclimate in protected cultivation.