

THE INFLUENCE OF COLOUR ON RADIOMETRIC PERFORMANCES OF AGRICULTURAL NETS

Sergio Castellano¹, Silke Hemming², Giovanni Russo³

¹PRIME Dept., University of Foggia, Via Napoli, 25, Italy s.castellano@unifg.it

²Wageningen UR Greenhouse Horticulture - Bornsesteeg 65, 6709 PD Wageningen, The Netherlands silke.hemming@wur.nl

³PROGESA Dept., University of Bari, Via Amendola 164, Italy giovanni.russo@agr.uniba.it

Keyword

Nets, permeable coverings, radiometric properties

Abstract

The whole construction parameters of the net, combined with the shape of the structure, the position of the sun and the sky conditions affect the radiometric performance of the permeable covering system.

The radiometric properties of the permeable membrane, such as the transmissivity, the reflectivity, the shading factor, the capability to modify the quality of the radiation passing through the net, influence the quality of the agricultural production and the aesthetic characteristics of the netting system. Moreover, the colour of the material and the light reflection- especially of the wavelengths visible for the human eye (VIS, 380-760nm)- is an interesting criterion to determine the aesthetic value of the net structure and its environmental impact. In order to investigate the influence of the threads colour on the radiometric properties of the net, a set of field tests were performed by means of a spectroradiometer (GER2600) with an acquisition range in the solar radiation in combination with an experimental setup 120x120x50cm covered with membranes formed by threads with different colour. The average values of transmissivity were calculated in UV, visible, PAR, NIR ranges. A second set of experiment was performed, on the same kind of nets, in laboratory by means of a large integrating (R=1.50m) sphere and a small one (R=0.50m). The total transmissivity in the PAR range (τ_{PAR} in 400-700nm) and in the UV range (τ_{UV} in 300-400nm) of 50x50cm samples was measured by means of the large integrating sphere. The haze, the diffuse component of the light passing through the nets in the PAR range, (τ_{HPAR}), was measured by means of the small integrating sphere.

The evaluation of the transmissivity values shows that the colour of a net influence spectral distribution of the radiation passing through the net absorbing their

complementary colours.

The transmissivity of black nets is almost constant in the visible range and the reduction of the incoming radiation is proportional to the solidity of the net. High values of transmissivity, more than 70%, characterise nets with transparent threads. In the PAR range transparent nets doesn't cause an alteration of the spectrum of solar radiation and transmittance is almost constant with a slight growth in nets having lower porosity.